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SPACE AND MISSILE SYSTEMS ORGANIZATION

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DOCUMENT HISTORY OF SAMOS

VOLUME I

DOCUMENTS
1 to 77

Prepared by

S. A. Grassly

November 1971

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CHIEF OF STAFF

SPACE AND MISSILE SYSTEMS ORGANIZATION

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DOCUMENT HISTORY OF SAMOS

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4. Memorandum for Colonel Terhune (C/Gp3), LtCol Frederic C. E. Oder, subj: Report of Trip 18-21 September 1956, 27 Sep 56, w/atch.

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6. MFR, LtCol Quenten A. Riepe, subj: Operational Concept for WS 117L, 8 Oct 56.

7. Ltr (C/Gp3), LtCol Frederic C. E. Oder, thru AFPR Lockheed Aircraft Corp to Lockheed Aircraft Corporation, subj: Briefing on Advanced Electronic Ferret Reconnaissance System, 12 Oct 56.

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24. DD Form 613 (C/Gp3), RDB Project Card, Short Title: ERSSFARS, WS 117L, 2 Apr 57.

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159. Msg (S/Gp3), WDZSO-11-1-E, 3 Nov 59.

160. MFR (S/Gp3), subj: SAMOS, MIDAS and DISCOVERER Programs, 6 Nov 59.

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163. ARDC Form 111, subj: Advanced Reconnaissance System, 13 Nov 59.

164. Memorandum for the Secretary of the Air Force (S/Gp3), SOD, subj: Transfer of the SAMSO Development Program to the Department of the Air Force, 17 Nov 59.

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191. Msg (S/Gp3), Hq USAF to Comdr ARDC, Info: Comdrs AFBMD, ADC, SAC, AMC, AFDAT 66936, 292335Z Jan 60.

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193. Msg (C/Gp3), fm AFBMD to CofS, info: ARDC, WDZY-1-5-E, 1 Feb 60.

194. LMSD Report (S/Gp4), Suggested Thorad/Agena Combination for SAMOS Program, 11 Feb 60.

195. Msg (S/Gp3), fm Hq USAF, AFDAT 70703, 152057Z Feb 60.

196. Msg (S/Gp3), fm SAC MIKE to CINCSAC, DDS-2-1-E, 16 Feb 60.

197. Chronology (S/Gp3), 17 Feb 60.

198. Msg (S/Gp3), fm Hq USAF to AFBMD and ARDC, AFABF and AFDDP 73993, 271712Z Feb 60.

199. Ltr (S/Gp1), fm WDZ to ARDC, subj: Joint French - U. S. Military Satellite Project, 29 Feb 60.

200. Current Status Report (S/Gp3), Feb 60.

201. Status Report - SAMOS (S/Gp3), Mar 60.

202. Memorandum for the Secretary of the Air Force (S/Gp3), subj: Intelligence System SAMOS, Apr 60. [Written 7 Dec 59]

203. Current Status Report (S/Gp3), Apr 60.

204. Ltr, ARDC, sgd MajGen James Ferguson to AFBMD, subj: User Participation, 12 Apr 60, w/1 Atch: Policy Statement.

205. Memorandum for Secretary of the Air Force (S/Gp3), sgd Herbert F. York, subj:SAMOS, MIDAS and DISCOVERER Research and Development Programs and Development/Operational Plans for SAMOS and MIDAS Programs, 20 Apr 60.

206. Ltr (S/Gp3), Lockheed Aircraft Corporation to AFBMD, subj: Augmented Re-Entry and Recovery Program, 19 May 60, w/1 Atch: Proposed Augmented Re-Entry & Recovery Program.

207. Msg (S/Gp3), fm AFBMD to ARDC, WDZY-4897, 24 May 60.

208. Ltr (S/Gp3), DAF (AFDSE-AT) sgd LtGen Roscoe C. Wilson, subj: Exploitation of Initial SAMOS Data, 1 Jun 60.

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210. Ltr (S/Gp3), ARDC (RDY), sgd MajGen James Ferguson, subj: Exploitation of Initial SAMOS Data, 14 Jun 60.

211. Briefing Charts - 1 June Guidance (Gen Wilson ltr).

212. Memorandum for Secretaries of the Army, Navy and the Air Force fm Secretary of Defense, subj: Coordination of Satellite and Space Vehicle Operations, 1[illegible]

213. Ltr (S/Gp3), fm CINCSAC to LtGen Bernard A. Schriever, Comdr ARDC, no subj, 16 Jun 60, w/1 Atch: CINCSAC Ltr to Gen Thomas D. White, 16 Jun 60.

214. Ltr (S/Gp3) fm USAF CofS Thomas D. White to Gen Thomas S. Power, CINCSAC, subj: SAMOS and MIDAS, 16 Jun 60.

215. Ltr (S/Gp3), fm Lockheed Aircraft Corp, to AFBMD, subj: Augmented Re-entry and Recovery Program, 20 Jun 60, w/1 Atch: Subcontract Work Statement, LMSD/362527.

216. Ltr (S/Gp3), AFCIN to AFORQ (Gen Smith), subj: Letter of Nonconcurrence, 21 Jun 60, w/o atchs.

217. Back-up Material for Secy Gates presentation to the President (S/Gp3), subj: SAMOS, 23 Jun 60.

218. Ltr (C/Gp4), SAC MIKE, AC, to Major Spindler, subj: SAMOS, 24 Jun 60.

219. Ltr (S/Gp3), sgd Gen Thomas S. Power, CinCSAC to Gen Thomas D. White, USAF CofS, no subj, 24 Jun 60.

220. Ltr (S/Gp3), sgd Gen Thomas S. Power, CINCSAC to LtGen Bernard A. Schriever, comdr ARDC, no subj, 24 Jun 60.

221. Ltr (S/Gp3), Hq USAF, AFCIN to DCS/D, subj: SAMOS, 24 Jun 60.

222. SSS (S/Gp3), fm AFDSD-AT, sgd John L. Martin, Jr, subj: SAMOS, 27 Jun 60, w/o Atchs.

223. Ltr (S/Gp3), sgd Col Lowell E. May, Chairman, Satellite Intelligence Requirement Committee to Secretary, United States Requirements Committee, subj: Transmittal of Intelligence Requirements for Satellite Reconnaissance Systems of which SAMOS is an Example, 29 Jun 60, w/1 Atch: Proposed letter of SOD.

224. Supplemental Hq USAF Guidance to ARDC, SAC and ADC Concerning SAMOS (S/Gp3), 29 Jun 60.

225. Ltr (S/Gp3), fm Hq USAF, Office of CofS, AFCCS, to Gen Thomas R. Power, CINCSAC, subj: SAMOS, 29 Jun 60.

226. Ltr (S/Gp3), Hq USAF, AFDSD-AT to Multiple Addresses, subj: SAMOS, 30 Jun 60, w/o Atchs.

227. Ltr (S/Gp3), Hq USAF, AFORQ-PN/Panel, to Reconnaissance Panel and SAMOS working Group Members, subj: Minutes of Joint Meeting of Reconnaissance Panel and SAMOS Working Group, 1 Jul 60, 1 Jul 60, w/4 Atchs of 5 Atchs: 1. Ltr fm Gen Wilson to ARDC, 1 Jun 60 (S); 2. Ltr fm Gen White to Gen Power, 29 Jun 60 (S); 3. Supplemental Guidance by Gen [illegible] (S); 4. Factors Considered in Guidance Preparation (S).

228. Intelligence Requirements for Satellite Reconnaissance Systems of which SAMOS is an Example (S/Gp3), 5 Jul 60, w/o Atchs.

229. Ltr (S/Gp3), AFORQ-RN/Panel to Reconnaissance Panel and SAMOS Working Group Members, subj: Minutes of Joint Meeting of the Reconnaissance Panel and SAMOS Working Group, 6 Jul 60, 6 Jul 60.

230. Ltr (S/Gp3), AFORQ-RN/Panel to Reconnaissance Panel and SAMOS Working Group Members, subj: Minutes of Joint Meeting of the Reconnaissance Panel and SAMOS Working Group, 7 Jul 60, 11 Jul 60.

231. Msg (S/Gp3), fm Hq USAF to Comdr ARDC, info: Comdr AFBMD, 20 Jul 60.

232. Ltr, AFBMD (WDLPR-3, to WDLE-1, WDZ and WDG In Turn, subj: Request for Approval - PR-61-BMD-59, 25 Jul 60.

233. Ltr (S/Gp3), sgd Gen Thomas S. Power, to Gen Thomas D. White, CofS, subj: SAMOS, 26 Jul 60.

234. Special Order No. 540 AFBMD 27 Jul 60.

235. Ltr (S/Gp3), SAG MIKE (DSS, to WDZ, subj: SAMOS System Improvement, 29 Jul 60.

236. SO No. 562 AFBMD 4 Aug 60.

237. Ltr (C/Gp4), WDZ to Col Paul J. Heran, Chairman, Source Selection Board, E-6 SAMOS, 30 Jul 60.

238. Msg (S/Gp3), fm AFBMD to AFBMD Field Office, Patrick AFB, WDZY-2-8-1, 2 Aug 60.

239. Msg (S/Gp3), fm Hq AFBMD to 1st Msl Div, Vandenberg AFB, info: ARDC, WDLL 4-8-3, 4 Aug 60.

240. Msg (S/Gp3), fm Comdr, Hq AFBMD, to Comdr ARDC, WDG-6-8-20, 7 Aug 60.

241. Ltr, WDG to WDZ, subj: RAND Letter L-15001, w/1 Atch, Ltr RAND Corp, 29 Jul 60.

242. Ltr, WDG to Mr. Herschel J. Brown, VP and Gen Mgr, Lockheed Missile and Space Division, no subj, 10 Aug 60.

243. Ltr, AFBMD (WDZE), to WDA, subj Organizational Announcement, 10 Aug 60, w/2 Atch: 1. Symbol Listing for WDR, Space Security Reconnaissance; 2. Symbol Listing for WDZ, Space Programs.

244. SAMOS Launch Schedule Revisions (S/Gp3), 11 Aug Development Plan.

245. Ltr (FOUO), WDV to Col Evans (WDZ), subj: Issuance of RFP's on the SAMOS Second Source, 12 Aug 60, w/1 Atch: MFR, 12 Aug 60.

246. Ltr (C/Gp3), WDZ, sgd MajGen O. J. Ritland, to Dr. Ivan A. Getting, Pres, The Aerospace Corporation, subj: SAMOS Program, 12 Aug 60.

247. Ltr (S/Gp3), sgd Thomas D. White, CofS, to Gen Thomas S. Power, CINCSAC, subj: SAMOS, 17 Aug 60.

248. MFR (S/Gp3), AFARF-10, sgd Lewis C. Meyer, Ch, RD& Missile Div, Directorate of Budget, subj: SAMOS Revised Development Plan, 18 Aug 60.

249. MFR (S/Gp3), prepared by Maj. H. C. Howard, AFDSD, subj: SAMOS Management Plan, 22 Aug 60, w/1 Atch: Changes to the Current Status Report SAMOS.

250. Ltr, AFCCS to Deputies, Directors and Chiefs of Comparable Offices (No. 10), subj: Briefings for Individuals outside of the Executive Branch of the Federal Government, 29 Aug 60.

251. Secretary of the Air Force Order No. 115.1, subj: Organization and Functions of the Office of Missile and Satellite Systems, 31 Aug 60.

252. Secretary of the Air Force Order No. 116.1, subj: The Director of the SAMOS Project, 31 Aug 60.

253. Memorandum for the Chief of Staff from Dudley C. Sharp, Secretary of the Air Force, 31 Aug 60, w/1 Atch: List of assigned personnel.

254. Organization and Functions of the Office of Missile and Satellite Systems, ca 31 Aug 60.

255. Status Report (S/Gp3), subj: SAMOS (WS 117M), 31 Aug 60.

256. SO No. 649 AFBMD 2 Sep 60.

257. Ltr (C/Gp4), WDRSC to WDZJS, subj: Thor Boosters for SAMOS Program, 6 Sep 60.

258. Revised FY 1961 and FY 1962 Communication Cost Estimate Budget Projects 840 & 850 - SAMOS (S/Gp3), 12 Sep 60.

259. Memorandum for the Secretary of the Air Force (FOUO), subj: Reconnaissance Satellite Program, sgd James H. Douglas, Acting SOD, 15 Sep 60.

260. Ltr, SAFMS-1, sig BrigGen Robert E. Greer, subj: Establishment of SAMOS Project Office, 15 Sep 60.

261. GO No. 96 ARDC (FOUO), subj: Discontinuance of 4999th Data Processing Squadron, 21 Sep 60.

262. Director of SAMOS and Deputy Commander Space Programs Organization, 22 Sep 60.

263. GO No. 40 DAF, subj: Abolishment of the Office of the Assistant Chief of Staff, Guided Missiles, 23 Sep 60.

264. Ltr, AFBMD (WDG), sgd BrigGen Harvard W. Powell, to Deputy Commanders, Deputy Chiefs of Staff, Chiefs of Special Staff Offices, Chiefs of Offices through Directorate Level and Commanders of AFBMD Subordinate Organizations, subj: Correspondence Pertaining to the SAMOS Project, 26 Sep 60.

265. Ltr (S/Gp3), SAFMS-IDP to WDGE, subj: Items for Inclusion in AFBMD Chronology for Period 1 Jan - 30 Jun 60, 23 Sep 60, w/o Atch.

266. SAMOS Directives and/or Guidance (S/Gp3), ca Oct 1960.

267. SAMOS Program Progress Report Month Ending 30 Sep 60 (RCS: DD-DR&E (M) 397, 10 Oct 60.

268. AFBMD News Release, subj: SAMOS I Fact Sheet, ca 11 Oct 60.

269. Msg from AFBMD to ARDC, WDLP-17-10-7, 18 Oct 60.

270. Draft News Release, 18 Nov 60.

271. Draft News Release, 21 Nov 60.

272. Draft News Release, 21 Nov 60.

273. Mission Statement, 6594th Test Wing, 29 Dec 60.

274. Chronology of Sentry and SAMOS Program 2 March 1959 to December 1960, (S/Gp3), Jan 61.

275. Ltr, Aerospace Defense Systems Office (ADC), ADSO to WDL, subj: Using Command Participation, 24 Jan 61, w/o Atch.

276. AFBMD News Release 61-18, ca 31 Jan 61.

277. AFBMD News Release 60-82, subj: SAMOS II Fact Sheet, ca 31 Jan 61.

278. Msg (C/Gp3), fm AFCCS to ARDC, AFCCS 87626, 092319Z Feb 61.

279. SO No. G-15, ARDC, 16 Feb 61.

280. Ltr (C/Gp4), WDZJS, to LBZST, subj: Procurement of 4 Thor Boosters, 14 Mar 61.

281. Ltr, sgd BrigGen Harvard W. Powell, to Comdr Pac Msl Rg, Point Mugu, Calif, subj: PMR Support of SAMOS and MIDAS Programs; 7 Apr 61.

282. Memorandum for the Secretary of Defense, Attn: BrigGen George S. Brown, (S/Gp3), subj: SAMOS Launch Report, 11 Sep 61.

CONFIDENTIAL

WDD (ARDC) INGLEWOOD
CALIF

132330Z MAY [illegible]

PRIORITY

MAJ GEN STUART P. WRIGHT [illegible]
CDR, RADC
ROME, NEW YORK

WDG-5-6-E. I HAVE TALKED TO DEAN WOOLDRIDGE ABOUT THE INTELLIGENCE DATA HANDLING SYSTEM PROJECT AND FEEL THAT IT WILL IN NO WAY INTERFERE WITH THEIR CAPABILITY FOR CARRYING OUT THE ICBM PROGRAM. SGD B/GEN B.A. SCHRIEVER.

Green cy - Reading file
Yellow cy - Official file

cc: Dr. Wooldridge

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

REPORT OF THE SCIENTIFIC ADVISORY BOARD RECONNAISSANCE PANEL ON RECONNAISSANCE FROM SATELLITE VEHICLES

28 May 1956

The instrumented earth satellite is one of the most exciting adventures in the Air Force research and development program, and the Reconnaissance Panel has enjoyed its share of the enthusiasm with which this challenge is being met. To launch a group of satellite vehicles and maintain them in orbits several hundred miles above the earth seems to all of us a great enterprise linked to the traditions of Donald McKay's clipper ships and the Wright Brothers' airplane.

√

The prospect of utilizing such vehicles for aerial reconnaissance has been one of the strongest incentives in their development. Beginning with early RAND studies, the possibilities of television and ferret satellites have been discussed and explored. At the present time, three major systems studies are in progress under ARDC sponsorship. Each of these studies is motivated by the conviction that military intelligence of great value will be obtainable from reconnaissance satellites. There is a strong desire by all concerned to reinforce this conviction with experimental evidence on two crucial questions:

(1) What is the characteristic image detail required for recognition of important intelligence targets?

(2) What is the image quality obtainable with the different satellite systems now contemplated?

These questions are, in principle, pertinent to both visual and ferret reconnaissance; the present discussion and recommendations, however, are limited to visual reconnaissance.

On the two questions which have been cited, the technical data now available are few and meager. This circumstance threatens to slow down the development of reconnaissance satellites. The difficulty has been recognized by the Air Force, and a number of experimental investigations have been initiated by Rome Air Development Center. These efforts have not yet produced the results that are required, but they reflect a realization that important technical answers can be obtained now by conducting experiments in the United States with available aircraft, balloons, and laboratory techniques. Such experiments will also permit an appraisal of the changes in photo-interpretation practice that will become necessary when large quantities of small-scale [illegible] records become available.

[illegible] VIGOROUS SUPPORT [illegible] SPONSORED [illegible] THE INTELLIGENCE [illegible] SATELLITE [illegible] PROGRAM TOWARD THE EARLIEST POSSIBLE [illegible]

TERMS, OF EXACTLY WHAT TYPES OF INTELLIGENCE THE SATELLITE SYSTEM CAN BE EXPECTED TO YIELD, THE AIR FORCE WILL ESTABLISH A SOUND BASIS FOR ITS FUTURE PLANS.

In the discussions which the Panel has had with Air Force groups and contractors on this subject, one qualitative conclusion has emerged rather clearly, even in the absence of quantitative data: For the major intelligence objectives that can now be foreseen, the advantages of high image resolution are of decisive importance. The growing threat of intercontinental ballistic missiles has put a very large premium on the recognition of objects with characteristic dimensions of 20 feet or less.

In this situation, it is not too early to examine the price of high resolution: Heavier demands will be placed on the technical performance of all components and sacrifices will have to be made in either completeness of cover or frequency of surveillance.

THE RECONNAISSANCE PANEL RECOMMENDS IMMEDIATE CONCENTRATION OF THE RECONNAISSANCE SATELLITE EFFORT ON HIGH RESOLUTION IMAGE SYSTEMS AIMED AT THE RECOGNITION OF GROUND OBJECTS WITH CHARACTERISTIC DIMENSIONS OF 20 FEET OR LESS. THE DEVELOPMENT OF PIONEER SEARCH SYSTEMS OF SUBSTANTIALLY LOWER RESOLUTION APPEARS JUSTIFIABLE ONLY TO THE EXTENT TO WHICH SUCH SYSTEMS MAY BE NECESSARY STEPS IN REALIZING THE PRIMARY HIGH RESOLUTION GOAL, OR IN DIRECTING THE HIGH RESOLUTION SYSTEMS TO PRIORITY TARGETS.

The achievement of a high resolution satellite system will be contingent on component improvements of substantial magnitude in such different fields as attitude control and stabilization, photosensitive materials, image storage devices, and physical recovery techniques. System contracts will be most fruitful if they provide financial latitude for fundamental component improvement work in areas specified by the systems contractors.

The current system design studies in this field have been greatly benefited by the Air Force's program of giving the contractors a broad background of information on military objectives. The Panel wishes to endorse the view that the challenging problems of satellite reconnaissance will be most effectively solved if the contractors' objective is not a vehicle of specified performance, nor an image recording system of specified characteristics, but rather a set of intelligence results of high military value.

THE RECONNAISSANCE PANEL:

Dr. Carl F. J. Overhage, Chairman
Dr. James G. Baker
Mr. Allen F. Donovan
Dr. Edwin H. Land
Dr. Duncan E. Macdonald
Mr. Stewart E. Miller
Mr. Phillip G. Strong

[redacted]

SEP 5 1956

X AT X

DEFERRED

COMDR WDD, INGLE, CALIF

COMMANDER ARDC, BALTO
ATTN: RDZPI and RDZGW

INFO: COMDR RADC, NY
ATTN: MR. MILTON ROSENBERG, RCOTI

~~SECRET~~ FROM WDTR 9-1-E

RDZPI AND RDZGW ARE INVITED TO SEND ONE (1) REPRESENTATIVE EACH TO A 1 DAY PRESENTATION BY RADC CONTRACTORS SUPPORTING WS 117L. THE CONFERENCE WILL BE HELD AT RADC ON 19 SEP 56 ON SUBJ: INTELLIGENCE PARAMETERS AND INTELLIGENCE DATA PROCESSING FOR THE ARS. MR. MILTON ROSENBERG, RCOTI, IS THE WS 117L CONTACT AT RADC. PLEASE SEND CLEARANCE AND RESERVATION NEEDS TO HIM WITH INFO TO WDD

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DOD DIR [illegible]

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WDTR

LT. HERTHER
13/[illegible]

SIGNED
FREDERIC C. E. ODER
LT COLONEL, USAF
ASSISTANT FOR WS 117L
[illegible] OPERATIONS

CONFIDENTIAL

Hull
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MEMORANDUM FOR COLONEL TERHUNE

27 September 1956

SUBJECT: Report of Trip 18-21 September 1956

1. Together with Lt. Colonel Riepe, I attended a two day briefing at RADC on the WS 117L technical support program of that center. A copy of the agenda is attached. RADC is responsible for the Intelligence Parameters Task and for the Intelligence Data Handling Task under the old Project 1115.

2. With a few exceptions the RADC support of WS 117L is well conceived and effectively operated. The Center has established an ARS Special Research Studies Group under the charimanship of Dr. Duncan MacDonald of Boston University for the purpose of regularly reviewing and evaluating the center efforts in support of WS 117L. At the briefing the Research Studies Group was represented by Dr. MacDonald, Mr. Walter Levison, Boston University, and Mr. Amerin Kats of RAND. Their critique of the RADC presentation was very worthwhile and should serve as excellent guidance to the Center.

3. I discussed with Center and Lockheed representatives (headed by Mr. Libby and Mr. Salter respectively) their respective roles in the technical areas involved in regard to WS 117L. I told them that it was the position of this office that, subject to the availability of funds and desireability of program, we would continue supporting the center effort as long as it furnished valuable guidance and inputs to our planning and that of Lockheed. I pointed out, however, that this did not relieve Lockheed of the responsibility of insuring necessary inputs to the system development program in the subsystem areas concerned in their role as prime systems contractor. I stated (with RADC agreement) that we would encourage Lockheed working directly with the Rome contractors provided that this did not involve Lockheed redirection of the RADC contractor's effort. If Lockheed felt that redirection of effort was necessary this could only be accomplished by their request through us to Rome. In answer to a question from Mr. Salter, I stated that we would have no objection to Lockheed establishing a subcontractual relationship with the Rome contractors any different than the considerations involved in any proposed Lockheed subcontractor. We would, however, want to be assured that no duplication of effort between Rome and Lockheed was evident since this would be a waste of funds.

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4. On 21 September 1956, I presented a briefing on WS 117L to Mr. Frederick Ayer, Special Assistant for Intelligence to the Secretary of the Air Force and to Mr. Randolph Zander of OSO/OSD. The briefing of Mr. Ayer had been requested by Colonel Ahola. Mr. Zander had been invited by Mr Ayer who had been previously furnished a "rough sketch" by AFDRD on WS 117L but the AFDRD representative were unable to answer any of Mr. Ayer's questions, and accordingly, we went in to do the job properly. We had about an hour and a half of Mr. Ayer's time and I left with a feeling that he was a supporter of the WS 117L program since he was speaking in specific terms of the action that he would have to take in securing the Secretary's support of the program.

FREDERIC C. E. ODER
Lt. Colonel, USAF
Assistant for WS 117L
Technical Operations

RADC BRIEFING

ON WS117L [illegible] PROGRAM

AGENDA

[illegible]	Introduction	Colonel James W. Anderson [illegible] L. [illegible]
[illegible]	Purpose of Meeting Definition of System Establishment of Technical Program	[illegible]
0900	Planning Research Corporation Mr. Alex Wylly Mr. Eugene Kiefer	Major James Suttie
1030	Coffee Break	
1100	Aero Service Corporation Dr. Churchill Mr. Wickham	Capt William E. Callanan
1200	Lunch	
1330	Boston University Dr. Robinson Mr. Dussault	Lt. Dorothy Assink
1445	Coffee Break	
1515	Ohio State University Dr. Pepper Dr. Fry	Dr. Philip J. Bursh
1615	RADC - WDD - Lockheed Aircraft Corp Critique	

22 September 1956

0815	International Telemeter Corp	Mr. Robert F. Sutton
[illegible]	[illegible] Institute [illegible]	Mr. Alvin L. Dunning
0930	Coffee Break	
1000	[illegible] Electronics TV Corp [illegible]	Mr. Alvin L. Dunning

[illegible] (Continued)

[illegible] Comments by Dr. [illegible], Chairman, AES Special Research Studies Group

[illegible] [illegible]

[illegible] Technical Program Evaluation - RADC - WSD - Lockheed Aircraft Corp

THE RAMO-WOOLDRIDGE CORPORATION
LOS ANGELES 45, CALIFORNIA

5

INTEROFFICE CORRESPONDENCE

TO: Lt. Gen. [illegible]

CC: J. C. Fletcher
W. B. Hebenstreit
Col. O. J. Ritland
Col. C. H. Terhune ✓

DATE: 8 October 1956

SUBJECT: R-W [illegible] Developments

FROM: S. Ramo

In our conversation the other day concerning R-W's potentialities for hardware subsystem contributions to 117L, I mentioned our advanced developments in the communications fields, but I did not include mention of certain of our airborne digital computer work. Unfortunately, as you know, the communications work has so special a security classification attached to it that it will not be possible for you to inspect this hardware and determine its applicability to your project until we are successful in arranging for some relief from the security restrictions that now apply. However, this problem does not appear in connection with our airborne digital computer developments, and you and your staff are invited to look into these developments at your convenience.

The work I have reference to is being done in our Computer Systems Division. The director of the division is W. B. Hebenstreit, who would be glad to have his staff give you a complete presentation on the status of this work. This project is one financed by Westinghouse Electric and involves a number of important advances in computer logic and in details of electrical and mechanical design that increase the versatility and capacity of such units while decreasing size and increasing ruggedness. There have been a number of ways in which we have been able to check the status of this work against what is available elsewhere, and we are quite confident that it represents an important step ahead. The units will be ready for flight very shortly. The reason why I did not bring [illegible]

[redacted]

[illegible] geographical location and have advance knowledge, it appeared advisable to invite you to have the first inspection of this apparatus.

[illegible] hope will be the case, you are inclined to want to receive this presentation.

Simon Ramo

SR dbr

[redacted]

[redacted] L

MDTR 5 October 1956

MEMORANDUM FOR RECORD

SUBJECT: Operational Concept for WS 117L

Meeting with Mr. G. H. Putt and Mr. Ed Barlow of Rand Corporation at 0900, Monday, 1 October 1956.

The problem as stated to Rand included the following major items:

1. Devise an operational concept (s) for WS 117L that will provide planning inputs necessary to write the Qualitative Personnel Requirements Information, the Logistics Plan, the Final Operational Plan, Technical Crew Training Plans, and the Installations Plan.

2. Determine what information can be retrieved from the data collected by the System; Infrared, Visual and Ferret, that will be useful on a national basis, i.e. all Departments, Defense, State and Commerce.

3. Determine the optimum mixing ratio between Visual, Ferret and Infrared data collected to provide for maximum output to satisfy the National Intelligence requirements.

4. Establish the relative priority in determining the quick reaction time necessary to supply the needs of the Departments of State, Defense, Commerce, etc., or their specific needs; i.e. early warning, capability, intentions, economic conditions etc.

5. Determine effect of accuracy of coverage, i.e. scale factor, ground resolution, location accuracy for providing the data necessary to fulfill the national requirements.

6. Determine the parameters that could be varied, i.e. orbit, methods of analysis, etc., that would vary the ability of the system to fulfill the various national requirements.

Mr. Putt and Mr. Barlow seemed enthusiastic about Rand's accepting the problem. Mr. Putt stated that he would inform Western Development Division as to the acceptance or rejection of the problem probably within the next two weeks.

SIGNED

[illegible]
Lt Colonel [illegible]

[illegible] 3 YEAR INTERVALS;
AFTER 12 YEARS.

OCT 12 1956

WDTR

SUBJECT: (Unclassified) Briefing on Advanced Electronic Ferret Reconnaissance System

THRU: Air Force Plant Representative
Lockheed Aircraft Corporation
P.O. Box 551
Burbank, California

Copy to
RAND

TO: Lockheed Aircraft Corporation
Missile Systems Division
Attn: Mr. Robert Salter
7701 Woodley Avenue
Van Nuys, California

1. A briefing by Haller, Raymond and Brown, Inc. on their study of the Advanced Electronic Ferret Reconnaissance System (Uncl. Title) will be given at Western Development Division on 13 and 14 November 1956. This study by Haller, Raymond and Brown, Inc. is the result of contract No. AF 33(616)-3545 for WS 117L, monitored by the Aerial Reconnaissance Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio.

2. It is requested that representatives of Lockheed Aircraft Corporation, Missile Systems Division, attend this briefing. A clearance level of Secret will be required.

3. Security clearances shall be forwarded to Western Development Division, Attn: WDSIR.

FOR THE COMMANDER:

SIGNED

FREDERIC C. E. ODER
Lt. Colonel, USAF
Assistant for WS 117L
Technical Operations

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WDTR 56-1[illegible]

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Briefing on Advanced Electronic Ferret
Reconnaissance System (Unclassified Title)

OCT 12 1956

WDO
Attn: Major Schiavo

WDTR

Capt. Troetschel/
dh/1344

1. A briefing by Haller, Raymond and Brown, Inc., on their study of the Advanced Electronic Ferret Reconnaissance System (Uncl Title) will be given at Western Development Division on 13 and 14 November 1956. This study by Haller, Raymond and Brown, Inc. is the result of contract No. AF 33(616)-3545 for WS 117L, monitored by the Aerial Reconnaissance Laboratory, WADC, WPAFB, Ohio.

2. The briefing will, in general, cover two areas:

a. Priority of information collection by Dr. Glenn Musser of Haller, Raymond and Brown, Inc.

b. Technical ways and means by Mr. Wayne Burnett of Haller, Raymond and Brown, Inc.

3. If you desire to attend this briefing, it is requested that the names and security clearance of those attending be furnished to WDTR. A clearance level of secret is required.

SIGNED

FREDERIC C. E. ODER
Lt. Colonel, USAF
Assistant for WS 117L
Technical Operations

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Capt

DISPOSITION FORM

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4. [illegible]

5. [illegible]

6. [illegible]

[illegible]

SECRET ~~CONFIDENTIAL~~ 10

OCT 15 1956

WDTR

SUBJECT: Use of Light Amplification Techniques in the Visual Reconnaissance Subsystem of WS 117L

THRU: Air Force Plant Representative
Lockheed Aircraft Corporation
P.O. Box 551
Burbank, California

TO: Lockheed Aircraft Corporation
Missile Systems Division
ATTN: Mr. J. H. Carter
P.O. Box 504
Sunnyvale, California

[redacted]

[redacted]

[redacted]

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4. It is recommended that light amplification techniques be investigated as a possible means of increasing the capability of the Visual Reconnaissance Subsystem of WS 117L.

SIGNED

FREDERIC C. E. ODER
Lt. Colonel, USAF
Assistant for WS 117L
Technical Operations.

WDTR 1s
F C E Oder 1343

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SECRET ~~CONFIDENTIAL~~

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OCT 24 23 57 '56

ROUTINE
ROUTINE X AF
COMDR WDD, INGLEWOOD, CALIFORNIA

COMDR ARDC, BALTO

INFO: COFS HQ USAF WASHINGTON D. C.

[illegible]

~~SECRET~~ FROM WDTR 10-6 FOR RDSTI INFO COPY TO RDZPI LT COL GOMEZ AND AFOIN-Z COL CHARLES P RICHMAN

HALLER CMM RAYMOND AND BROWN CMM INC IS CONDUCTING A STUDY OF THE ADVANCED FERRET RECONNAISSANCE SYSTEM FOR THE WS 117L UNDER CONTRACT NO AF 33 PAREN 616 PAREN 3545 WHICH IS MONITORED BY THE AERIAL RECONNAISSANCE LABORATORY CMM WADC CMM WPAFB CMM OHIO PD IN ORDER TO ESTABLISH THE FORMAL AND ADEQUATE INPUTS TO THIS STUDY CMM IT IS REQUESTED THAT A BRIEFING BY AFOIN-Z FOR DR GLENN MUSSER OF HALLER CMM RAYMOND AND BROWN CMM INC BE SET UP WITHIN THE NEXT TWO WEEKS PD PERTINENT AREA OF THE HALLER CMM RAYMOND AND BROWN CMM INC STUDY PROBLEM IS AS FOLLOWS CLN TO DETERMINE THE NATIONAL INTELLIGENCE REQUIREMENTS THAT MAY BE SATISFIED BY ELECTRONIC RECONNAISSANCE METHODS PD IN PARTICULAR CMM THE PROBLEMS INVOLVED IN ESTABLISHING THESE REQUIREMENTS THAT CAN BE MET BY THE WS 117L FERRET

24 [illegible]
OCT 56

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WDTR
Captain William O. Troetschel
1343-44 1 2

RAYMOND E. ZELENKA
Major, USAF

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

~~SECRET~~

SECRET ~~CONFIDENTIAL~~

WDTR 56-205

[redacted]

SECRET

~~CONFIDENTIAL~~

COMDR WDD, INGLEWOOD, CALIFORNIA

OCT 24 23 57 '56

RECONNAISSANCE VEHICLE SUCH AS EMITTER CHARACTERISTICS CMM LOCATION LIMITS CMM DETERMINATION OF RADAR NETWORKS CMM AND MISSILE LAUNCH SITES ETC PD DR MUSSER HAS A VALID NEED TO KNOW IN THIS AREA PD HE HAS A TOP SECRET CLEARANCE WHICH WILL BE VERIFIED THROUGH SECURITY CHANNELS PD IN VIEW OF THE TIME ELEMENT INVOLVED CMM IT IS SUGGESTED THAT ACTION BE TAKEN THROUGH THE TASK ENGINEER CMM LT J NILLES PAREN WCLRR-3 CMM 32296 PAREN AT ARL CMM WADC CMM WPAFB CMM OHIO WITH INFO TO WDD-WDTR

18

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WDTR 56-205

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W O Troetschel

1s 2 2
1343-44

[redacted]

[redacted]

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[redacted]

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WDTR

MEMORANDUM FOR: Colonel Terhune
General Ritland

OCT 29 1956

SUBJECT: Reconnaissance Symposium at Fairchild Camera and Instrument Corporation

1. The Reconnaissance Symposium at Fairchild Camera and Instrument Corporation was attended by Captain Troetschel and Captain Conway of the WS 117L office.

2. The equipment displayed and discussed was photographic equipment for the RB-58 Weapon System. This included aerial cameras and ground photographic processing equipment.

3. The aerial cameras shown do not have the resolution capability required for WS 117L and are not applicable to the program. The suitability of the ground processing equipment would require further investigation which was not possible at the Symposium. Discussion of WS 117L applications was not attempted for security reasons.

4. An interesting device shown was an Ultrasonic Light Modulator which might possibly have some application in video recording. It was stated that one hour of video information could be stored on 1000 ft. of 70 mm film with this device. This study has been performed by Fairchild Camera and Instrument Corporation under Air Force Contract No. 33(039)-9339, and monitored by WCLRW at Wright Air Development Center, Wright-Patterson Air Force Base, Ohio. We are requesting the technical reports on this study for further investigation.

Frederic C E Oder
FREDERIC C. E. ODER
Lt. Colonel, USAF
Assistant for WS 117L
Technical Operations

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

WDTR 56-207

[redacted]

~~CONFIDENTIAL~~ 10-113

~~CONFIDENTIAL~~

THE RAMO-WOOLDRIDGE CORPORATION
LOS ANGELES 45, CALIFORNIA

11 1-04N

GM 01 - 65

13

29 October 1956

Mr. H. L. Hibbard
Senior Vice President
Lockheed Aircraft Corp.
P. O. Box 551
Burbank, California

Dear Hall:

For some time The Ramo-Wooldridge Corporation's Communications Division has been successfully producing and delivering certain electronic equipment for a highly classified mission. This mission has required from us some rather remarkable developments of airborne equipment on an unprecedented time schedule. The techniques needed were very advanced, so that the project was difficult both from the standpoint of research and development and production. We are very proud of the work that we have accomplished on this project, and are naturally very interested in seeing the results applied to other projects where applicable. WS 117L appears to us to be such a project.

20

As you probably know, R-W did not seek systems responsibility for the 117L project, the major reason being that we wished to maintain ourselves as eligible for hardware development and production. For one thing, we felt that we might be in a position to make an important contribution to this program hardware-wise because of the similarity that we thought might exist between what our Communications Division had already done and what Weapon System 117L requires.

Unfortunately, until recently the security rules applying to our work were so restricting that it was not possible for us even to disclose this work to the key people of your organization on 117L (and not even to the key people of WDD). General Ritland has been fully aware of our project because he was concerned with it from the Washington end before joining WDD. He is aware of this letter to you, and feels that full knowledgeability of our work in this area would be beneficial to you on the 117L project. A recent relaxing of the security restrictions has made it possible for us to disclose this work to the key WDD officials involved in 117L. Also, at this

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13

Mr. H. L. Hibbard
Lockheed Aircraft Corp.

time, we would like to present to you the potentialities of The Ramo-Wooldridge Corporation as a subcontractor to you, to provide certain of these special airborne components. In order for us to show you what we have and allow you a realistic opportunity to assess the advantages to you of exploiting our availability on behalf of the successful pursuit of your project, we think it desirable for you to visit us. Then you can observe all aspects of the program, including the equipment itself and our facilities for producing it.

While the security restrictions have been relaxed, they have not been lifted to the extent that we can be completely free in our invitation to you as to attendance. Since some lead time is required, I did some guessing and have already initiated a request that in addition to yourself, Louis Ridenour and Jack Carter be cleared to have full access. By the time you will have read this and have been able to choose a date for a visit here, we shall probably have a confirmation of clearance for you.

I hope to hear from you that you are indeed interested in looking into these possibilities, and that you and your associates will come over for a presentation. If you can do so, I would suggest that you choose some morning and remain to be our guests at lunch.

Sincerely,

ORIGINAL SIGNED

Simon Ramo
Executive Vice President

SR:ps

Mr. H. L. Hibbard
Lockheed Aircraft Corp.

13

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21

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Sincerely,

ORIGINAL SIGNED

Simon Ramo
Executive Vice President

SR:ps

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DECLASSIFIED. DOD DIR 5200.10

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14

(U) Operational Concept for WS 117L

WDG
WDT
(IN TURN)

WDTR

NOV 9 1956

F. C. E. Oder/la/1343

1. Shortly after the Development Plan WS 117L was approved and the Development Directive received, it was realized that there was an immediate need for a study to devise an operational concept for WS 117L.

2. Several organizations were considered as being capable of studying the problems of an operational ARS. Cost, unfamiliarity with the ARS, and the ability of the organization to contact the necessary parts of the National Intelligence community reduced this group down to the Rand Corporation and the Advanced Study Group of the Air University Command. This problem was discussed with Colonel Terhune, who approved of informally discussing this with Rand as a possible problem for them to consider as part of their program of studies for the Air Force.

22

3. Mr. Barlow, Chief of the Engineering Division of Rand, assigned the problem of defining the ARS Operational Concept and outlining the study team requirements to Mr. A. H. Katz and Mr. Merton Davies, who have had several sessions with Lieutenant Colonel Riepe of this office. Messrs. Katz and Davies have indicated that there is considerable interest within Rand in the problem. However, they have requested the WDD to state their interest in the results of such a study to the Management of the Rand Corporation. The expression of this WDD interest and the outline of the problem as we see it is the purpose of the attached letter to Rand.

4. Mr. Katz felt that the letter should be signed as high in WDD as necessary to represent the WDD interest.

1 Incl
Ltr fr WDTR to Rand Corp
2 pgs, 3 cys
(WDTR 56-213)

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

Two copy of ltr to Rand retained in WDD.

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WDTR 56-214

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15

[illegible]

ACTION

NOTE AND RETURN

SEE ME

SIGNATURE

REMARKS

We should let Oder
know that WDO has
prime interest in this, and
should be RAND's point
of contact. Even though
responsibility is not yet
assigned, WDO should take
the initiative. [illegible] will need
[illegible]

FROM: NAME OR TITLE

ORGANIZATION AND LOCATION

TELEPHONE

16

24

4

NECESSARY ACTION

NOTE AND RETURN

SEE ME

SIGNATURE

REMARKS

We have seen this and discussed it briefly with L/C Riepe (WDTR). ~~[illegible]~~ Since the ~~letter~~ proposed letter has (policy) organizational implications I believe it is a matter for your attention.

RDB

D. BOWERS
USAF
for Plan

17

~~CONFIDENTIAL~~

SECRET

OFFICE OF ORIGIN WILL ENTER OFFICE SYMBOL IN THE BLOCKS IN ORDER OF DESIRED COORDINATION PERSON COORDINATING WILL ENTER NAME AND DATE IN APPROPRIATE BLOCK
TO: WDO
NAME: Col Sheppard
DATE: 14 Nov 56
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NAME:
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WDO

14 November 1956

MEMORANDUM FOR COLONEL [illegible], [illegible]

SUBJECT: (U) Operational Concept for WS 117L

1. I concur that there is certainly an immediate need for developing an operational concept for the WS 117L and also that RAND, if they are willing, is possibly in the best position to furnish us with a useful draft concept. I have indicated my concurrence on Col Oder's Comment No. 1.

2. In connection with the operational efforts associated with the ballistic missiles systems, we have found that a very large number of man-hours are required in order to bring the various participating agencies into understanding and agreement on matters listed in par 5 of the letter to RAND. As a matter of fact this seems to comprise most of the work of WDO individuals. They are continually involved in what amounts to liaison activities with non-WDO offices locally, SAC, ARC, AMC, Hq USAF, WSPO, and other activities. Much of this effort is not only thankless but frustrating in that the results do not appear as specific papers, progress reports, or action items. On the other hand, it does result in a better understanding all-around and a net increase in the capability for making progress on a broad front.

3. The reason I have written the above essay is because I am completely uninformed as to how similar activities are going to be handled in the ARS program.

SIGNED

1 Incl
D/F fr [illegible], 9 Nov 56, as under date
Subj as abv w/1 Incl

WILLIAM A. SHEPPARD
Colonel, USAF
Deputy Commander
Plans and Operations

cc Col Bowers

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

SECRET

NAME:	OFFICE OF ORIGIN: WDO	TYPIST: bs
DATE:	DICTATOR: Col Sheppard	PHONE NO. 540

WDD FORM [illegible] FEB 56

~~CONFIDENTIAL~~

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CONFIDENTIAL [redacted]

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EXCERPTS FROM COMMITTEE REPORTS NAS-ARDC STUDY GROUP ON RESEARCH AND DEVELOPMENT OBJECTIVES FOR THE UNITED STATES AIR FORCE

1957

SECTION B. RECONNAISSANCE

RECONNAISSANCE MISSION

26

The reconnaissance mission may be considered in three operational phases. The first is concerned with the reconnaissance problem in peacetime, the second with information relative to a D-day strike, and the third with wartime reconnaissance. Technical accomplishment of the task in these three cases might require different reconnaissance systems and, in addition, political considerations enter in connection with prewar reconnaissance activities. It would be well, therefore, to discuss these tasks separately. The discussion will be limited to aerial reconnaissance systems and will not concern itself with the special problems associated with limited wars.

The peacetime reconnaissance mission is, in the main, directed at providing a continuous high order of intelligence data on the entire spectrum of the enemy's war-making potential and a continuous assessment of the probability that a surprise attack might be launched. Unfortunately, at present, even pioneer-type information does not appear to exist insofar as the USSR is concerned. It is, of course, obvious that precision mapping of the entire area is a basic requirement for the intelligence job. During the IGY, intercontinental distance ties will be established to a high degree of accuracy and with pioneer reconnaissance information it would then be possible to locate accurately any target point in the USSR with respect to any point in this country.

The next essential step beyond the pioneer mapping requirement is the definition of the target complex to required accuracies. Soft targets, such as cities, will have been located through the simple mapping function, but the major problems will involve questions such as remote facilities, strategic air bases, and in particular, possible hard targets such as ICBM launch complexes. Although all of these can probably be detected fairly readily during construction phases, it may be exceedingly difficult, if not impossible, to identify positively certain specific targets after construction has been completed.

With the announcement of a Soviet intercontinental missile capability, it is highly likely that over the next five years the Soviets will initiate an intense program in the activation of missile launch complexes. The precise location of such [illegible] of prime importance and [illegible] reliable detection will probably be possible only during the building phase [illegible] accentuates the need for a high level [illegible] capability [illegible] in a later time period [illegible] light of intercontinental [illegible] decrease [illegible]

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[illegible] subsystems become simpler, it is highly likely that there will be a trend toward mobile launchers. The use of solid propellant motors, in particular, would be [illegible] towards simplicity and reliability. Detection and immediate action against such targets present an extremely imposing strategic and reconnaissance problem.

Another important aspect of the prewar reconnaissance task is the accurate assessment of the enemy's defense complex. This includes determination of the locations of defensive aircraft and missile installations and information as to the electronic air defense network and its characteristics. Of considerable interest is the detection of movements of equipment, personnel, new construction, and, in particular, the detection of unusual preparations which may suggest hostile intent. A useful adjunct would also be the gathering of weather information over the USSR, and the improvement of meteorological forecasting for this area of the world.

These considerations imply, therefore, a continuous and comprehensive monitoring job.

An important element of a reconnaissance system is, of course, the capability for detection of initial attack. As mentioned above, an effective system will have the capability of assessing warlike preparations and of causing the activation of Alert procedures. The immediate and positive identification of the first act of war then becomes paramount.

In the post D-day period, the major functions of a reconnaissance system will be bomb damage assessment, the location of new targets for the strategic weapons, monitoring of the enemy's capability and direction for continuing action, and the detection of new attacks.

As will be developed in later portions of this report, the only system which appears to have the capability of accomplishing all these tasks satisfactorily is a suitably instrumented reconnaissance satellite. Its capabilities and its potential value suggest an active program to bring such a reconnaissance system into being at an early date.

It also appears possible that an interim capability for carrying out the vital peacetime reconnaissance functions that have been discussed is realizable with high altitude aircraft and balloons. Such a program would, obviously, be of great value.

While the use of reconnaissance satellites poses certain political questions, these are far less severe than are those that are associated with the use of relatively easily intercepted devices such as balloons or aircraft. The importance of the information that can be obtained with satellites suggests that political considerations should not preclude their use since the effectiveness and utility of our strategic retaliatory systems and hence our capacity to survive may lie in the balance. In addition, as will be treated later, the question of whether satellites constitute a violation of the air space over another country is moot, and logic suggests that such claims are rather weak. Positive identification of a satellite's function in reconnaissance is extremely difficult if not impossible, and interception in time to prevent data acquisition is very complex. [illegible] the very presence of satellites will [illegible] deterrent since [illegible] capability for immediate [illegible] preparations [illegible] probability of success of [illegible]

Such a device appears, therefore, simultaneously to hold forth the possibility of enhancing the prospects for peace by increasing deterrent strength while at the same time adding greatly to the effectiveness of the retaliatory striking force should it have to be employed.

RECONNAISSANCE CAPABILITIES

Methods of Observation

The most fruitful methods for the collection of reconnaissance data at the present time appear to be photographic, radar, infrared, and electromagnetic techniques, and combinations thereof. The usefulness of these methods depends upon a number of factors, including resolution, coverage, security during acquisition, all-weather operations, and vulnerability to countermeasures. In addition, such factors as size, weight and complexity, and installation and maintenance difficulties must be considered.

At the present time, photography gives the best resolution and is the most valuable tool in high altitude reconnaissance. However, in connection with the use of film, it appears highly desirable to pursue programs for the development of films that are insensitive to radiation. These are important from the consideration of effectiveness against countermeasures. Blurring, due to ground motion, is eliminated by swinging mounts or by continuous strip photography using a moving film. By these means and by special mounts to minimize engine vibration, resolutions on the order of 40 lines per millimeter can be achieved with reconnaissance aircraft. Among the limitations of this tool are the needs for adequate weather conditions and adequate light, and the fact that the photograph must be brought back to base to be useful. Television reconnaissance techniques are under investigation to eliminate the last limitation. However, television is even more limited as regards lighting conditions, and compared to an area photograph it has very inadequate resolution.

Reconnaissance radar is valuable for radar charting, for all-weather navigation and bombing, and for data collecting under nonvisual conditions. Penetration of cloud layers 4000 to 6000 feet thick and through areas of light rain and snow is possible. High resolution radar is limited to a range of ten miles on either side of the air vehicle, which means that a very large number of paths would have to be traversed to scan the vast territory which must be examined. The greatest weakness of radar is the matter of security during acquisition. Radars are detectivle and very vulnerable to ECM. Radars also require substantial amounts of electric power to operate. This power must be closely regulated and controlled. In addition, the electronic components require air conditioning when they are carried in high altitude, high performance air vehicles. Finally, radar operating from a reconnaissance vehicle is likely to make it an easy target for missiles that have suitable homing devices.

Infrared sensing provides a capability of passively detecting targets which [illegible] operates in darkness as well as in [illegible]. The principal limitation [illegible] ranges in the region of the [illegible] below about 20,000 feet [illegible] water vapor and [illegible] greatest usefulness [illegible] might be expected to occur in detecting high altitude objects from a high altitude point of observation.

Electronic reconnaissance can be subdivided into two types. In the first of these, electromagnetic signals from the enemy are detected and classified according to the nature, characteristics and geographical location of the source. In the second type, the attempt is to record and decode enemy communications.

Satellite Reconnaissance

Satellites that operate in circular orbits 300 miles above the earth's surface will travel about 5 miles per second and make 16 revolutions around the earth per day. A single satellite in a polar orbit will make four passes per day on the average over a square area 2000 miles on a side and centered at 50° latitude.

A camera could be mounted in a satellite that is attitude stabilized to about one degree. With the use of a six-inch focal length and fine grain continuous strip film, it should then be possible to obtain a resolution of 100 lines per millimeter, which is equivalent to a 100 to 200-foot resolution on the ground. By this method a satellite can continuously photograph a zone 100 miles wide at a rate of 500 square miles per second. Two passes per day during daylight hours would yield photographs of 400,000 square miles per day. An area of four million square miles would thus take ten days to photograph if no cloud cover intervened and if there were no overlap of zones. Multiplying the time by three to compensate for these factors, we arrive at about a month to map out the entire area.

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During the operation the film would pass through the camera at about 1/10 of an inch per second. When sufficient exposed film was accumulated, the film would be developed, dried, and stored pending readout. Readout could be accomplished as soon as communication had been established with the ground station by scanning the exposed film with a narrow beam of light, converting the emerging beam into electrical impulses, and transmitting this modulation to the ground. To reproduce the pictures transmitted by the satellite, essentially the reverse process would be carried out on the ground.

The time that will be required for a satellite to photograph an area in the manner described above is roughly independent of the size of the area. It will take about a month, whether it is a portion of Russia or the combined continents of Asia and Europe. The amount of film and chemical however, will be proportional to the size of the territory photographed as will the information to be read out. About one pound per day will be required for the reconnaissance satellite system described in the preceeding paragraphs. If photographs are accumulated at a greater rate than one pound per day, then more readout time (longer range or more ground stations) or greater bandwidth must be provided to prevent readout from falling progressively further behind the time of acquisition.

A resolution of 100 feet on the ground permits very detailed mapping, including identification and location of [illegible] railroad yards, docks, military bases, [illegible] of a 36-inch [illegible] provide resolution of about [illegible] would permit the [illegible] airport classification [illegible] resolution [illegible] equipment, missile [illegible]

[illegible] Using film of the same width as the 6-inch lens, photographs of a zone [illegible] miles wide could be obtained. On the other hand, the film speed would be increased by a factor of 6 and a readout bandwidth 6 times as great would be required if one took pictures continuously while over enemy territory. These considerations suggest that such a long lens would best be employed for detailed examination of regions of special interest and not for complete coverage of large territories. Two satellites, one employing a 6-inch lins and the other a 36-inch lens, would permit continuous surveillance of any part of the globe: the first to 100-foot resolution, locating absolute position of targets to a mile or less, with observations repeating about once a month; and the second securing inspection of selected targets as desired to a resolution of 17 feet.

Satellites for visual reconnaissance at higher altitudes are sometimes discussed and higher altitude has some advantage. At higher altitudes, satellites have greater coverage of the ground and are harder to destroy by enemy action. A third advantage is that a system of intercommunicating satellites for instantaneous global coverage can be accomplished with fewer satellites at higher altitudes.

Higher altitude, however, has disadvantages such as a longer communication link with the ground station and less payload for a given propulsion system. In addition, if one desires resolution approaching the details discussed in the preceding paragraphs, significantly higher altitude suffers a very serious disadvantage in that the requirement for a camera of longer focal length must be associated with better attitude stabilization. It turns out that the restoring torque due to gravity, which is relied upon for attitude stabilization, varies inversely with the third power of the distance from the center of the earth. A satellite with an eight-hour period at an altitude of about 7500 miles would therefore have about 1/27 of the restoring torque that would be experienced by a satellite at an altitude of 300 miles. Similarly, the so-called 24-hour satellite which has the advantage of staying above the same portion of the earth indefinitely would have a restoring torque amounting to about 1/200 of that experienced by a 300-mile altitude satellite. Experience at the lower altitude may, however, serve to develop the technical skills that will be required to rise, to higher orbits.

An ICBM emits tens of megawatts of infrared radiation during boost, and it can therefore be detected readily at distances of thousands of miles in the absence of water vapor. When over any part of Russia, a satellite in a 1000-mile orbit would be able to scan all of the country simultaneously with instant signaling of ICBM launch observations to a station in Greenland. A single satellite could detect launch points to approximately 50 miles, count the number of ICBM's and give a rough idea of the direction in which the attack is being launched. Approximately a dozen satellites would be required to keep the U.S.S.R. under virtually continuous observation at 1000-mile altitude. Such a system would normally allow simultaneous observation of a launch by two satellites, thus providing some tracking capability.

Another mission to which infrared equipment is well-adapted in a satellite is the detection and tracking of high Mach number bombers. Such aircraft achieve long range only at high altitude; while they might seek to escape detection from infrared by flying at [illegible] cloud cover, the result of this [illegible] to lose the range upon which [illegible] intercontinental striking capability [illegible] under favorable weather conditions [illegible] detectors could also be used [illegible] the degree

CONFIDENTIAL [redacted]

of activity in airfields, transportation centers, and the like.

Ferret reconnaissance systems are designed to locate, classify, and identify sources of electromagnetic radiation in enemy territory. A satellite that carries ferret equipment could locate signals coming from within enemy territory to approximately 50 miles, classified according to carrier frequency, pulse duration, pulse repetition frequency, location, time of day, etc., and communicate this information to the ground station. The information could be used to assess enemy electronic capabilities; to locate special targets, such as missile launch sites; to observe changing degrees of activity in various areas; and to gage enemy electronic defense capabilities.

The techniques that have been described are all within the state-of-the-art or modest extensions of it. All of them are secure in the sense that there would be no way for an enemy to know that reconnaissance activities were being carried on.

Radar is not considered to be a useful technique in a satellite platform for two reasons. First, a large amount of power would be required. Second, adequate resolution does not appear to be feasible at the present time. In addition, of course, radar scanning would be observed by the enemy and would be subject to jamming.

In the discussion so far, it has been assumed that the information in the satellite will be communicated to the ground by electronic readout. This is necessary if the required information is to reach our intelligence centers as soon as possible. Under certain circumstances, however, it may be desirable to consider physical recovery of information by such means as ejection of a re-entry capsule. This procedure is not impossible, but does present a significant development effort. It might be necessary, however, to resort to this technique if enemy jamming of our ground stations made it difficult or impossible to acquire the needed information. Similarly, if one wanted to acquire information at too great a rate for readout, physical recovery might be desirable. For example, there might be a need to map the entire U.S.S.R. and China plus all Iron Curtain countries within one month. In this case the best procedure might be to photograph the whole area and eject the film in a re-entry capsule when the job is done.

CONCLUSIONS AND RECOMMENDATIONS

In terms of the reconnaissance mission as defined on pages II-3 and -4 and based on the comparative considerations of the different reconnaissance systems contained in the body of this report, the conclusions and recommendations of this reconnaissance study may be summarized below. The recommendations are based on a recognition of the fact that ballistic missiles will demand highly accurate target information to be effective units of a striking force; and the hard targets such as enemy ICBM launch sites are [illegible] susceptible to detection during construction and hence probably during a [illegible] period. The recommendations are also influenced significantly by the demands for the [illegible] possible warning of a surprise attack.

[redacted] CONFIDENTIAL

1. The reconnaissance satellite is the only system that is capable of accomplishing the complete reconnaissance job. The system appears to be within or close to the present state-of-the-art and can utilize booster units from the 107A program. It is recommended that the earliest possible development of a reconnaissance satellite be pursued with vigor.

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WDG

4 February 1957

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: ARS

1. The question arises as to the total scope of the WS-117L program as it relates to the problem of data handling. I am aware that the ARS introduces a number of new problems with respect to data handling, which support arguments that the weapon systems development should include that element. However, I can advance arguments to the contrary.

2. Prior to finalization of the Lockheed work statement, I would like a briefing on the above with recommendations as to the desired course of action.

(s)

B. A. SCHRIEVER
Major General, USAF
Commander

cc: General Ritland

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INTERVALS: NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

WDG [illegible]
Gen Schriever [illegible]

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DISPOSITION FORM

[illegible]

[redacted]

Subject: Intelligence Data Handling System Support for WS-117L

[illegible] Non-special Intelligence functions at Hq USAF, Theatres, Commands, [illegible] their assigned reconnaissance units, and other indirectly controlled collection sources.

(2) A large number of various [illegible] highly sensitive Vertical Systems, highly compartmentalized, each of which has no or at best very limited cross-tie with other systems which affords little or no mutual support or cross fertilization for either optimum operational [illegible] control of the collectors, or for obtaining best possible interpretation and utilization of the collected data. Some of these Vertical Systems penetrate the standard system organizationally in which case they again form highly secure compartments.

e. A firm requirement exists for across-the-board timely information feedback to the ARS from the entire USAF intelligence organization to make for meaningful interpretation and evaluation of the results and most important for the efficient control and operation of this complex ARS system.

f. Intelligence information integration at an early all source evaluation point is the first basic step toward integrating all of the special intelligence operations. It is therefore believed that the ARS will give great impetus toward this much needed integration and central control of collection operations because of its required direct tie to the users and its capability to supply important and possibly major collection support to each of these already going operations.

g. Development of the ARS in addition to supporting the intelligence community must be geared to operationally support the intelligence timing requirements imposed by such new weapons as the ICBM and IRBM. These requirements dictate immediate and direct ARS tie to these programs for targeting and IBDA purposes.

h. The ARS will produce a product which requires ground data handling equipment, techniques, people and an organization to utilize the collected product. This will be a new addition to the present Air Force structure, the timing and development of which must mate with the ARS development and operation, and must mesh with, support and receive feedbacks from the then operating and planned intelligence organization.

i. System Requirements No. 5 (WS 117L) recognizes this need and charges development of an intelligence data handling system for WS 117L operations to the WS 117L program.

j. System Requirement No. 13 (438L) charges design and development of all intelligence data handling work to System 438L, and hence a basic conflict exists within current ARDC directives.

k. Present status of 438L:

(1) Intelligence system design study will be completed by prime contractor in March 1957, culminating [illegible] fifty (50) man years of intelligence organization and operation [illegible] for a cost of about [illegible] million [illegible]

(2) The System Development Plan embraces the below listed projects, all pointed toward an immediate improvement program to provide equipment and procedure in support of the intelligence data handling functions of a major Air Command. Work is underway to develop, procure, install and test the individual pieces of equipments in preparation to a full scale 1 year system test under operational conditions in USAFE during calendar year 1960.

(a) USAF Intelligence Data Handling System Design and Development, Project #4588.

(b) Operational Intelligence Data Handling (Airborne), Project #4061.

(c) Dispersal Base Data Handling, Project #5537.

(d) Major Reconnaissance Technical Processing Control, Project #4586.

(e) Electronic Data Processing, Project #5532.

(f) Rapid Reaction Data Handling, Project #5533.

(g) Intelligence Library Mechanization, Project 4591.

(h) Qualitative Personnel Requirements, Project #8730.

(3) The development program as noted excludes whole portions of the standard operational intelligence system, such as the intelligence estimating functions within the D/I, Hq USAF and ATIC, and the target material production work at ACIC and Hq SAC; and does not include development work for or further study of the special or vertical system. It nevertheless does cover many of the common functions such as photo, radar and infra-red interpretation techniques and equipments, coding and indexing schemes, document and graphic storage facilities and devices, displays, computation and data reduction equipment and dissemination equipments and procedures, which may, in one form or another, be applicable in part to the other areas. It is important to note that the orientation of this work takes into account the type of product and approximate volume flow that an overseas theatre Air Command will predictably experience in the 1960-1963 time period.

(4) Funding approval for the development of this system is still not firm.

(5) System management lines are extremely tenuis. (At present the planning responsibility for the System rests with Hq ARDC, Directorate of Systems Plans, Colonel G. Prentiss. This has been delegated to the Intelligence Laboratory at Rome. The responsibility for systems management has rested with Colonel Forrest Allen in General Estes, Det No. 1, Wright-Patterson Air Force Base, for approximately seven months and to date a SPO has not been established, rather by default the responsibility is carried by the Intelligence Laboratory.

at RADC and the ARDC Directorate of Systems Plans. Because of a natural conflict of interests between technical developments where funds are extremely scarce, and systems work, it does not appear likely that the Laboratory or Centers can exercise best systems management direction and control.)

l. Lockheed Aircraft Corporation does not now possess adequate understanding, competency or capability in the intelligence data handling area to fulfill the system design and/or development responsibilities required for this system.

m. It is the intent of WDD (Air Force) not to have a prime system contractor build up an in-the-house capability to perform those areas of work for which it is not inherently suited particularly when these capabilities already exist in other groups.

3. Conclusions:

a. The theoretical point where development responsibility should shift from collection system to the data handling system is where in the development of the system an interpretable physical product is reached with accompanying available data for identification and location purposes, such as mag tape, developed (uninterpreted) photographic material, wire recordings, etc. Further processing, i.e., interpretation, analysis, storage, display, dissemination, etc. becomes intimately tied to knowledge and understanding of the users, their needs, methods, equipment and capabilities. It appears realistic to assume that these design and development requirements would be most efficiently fulfilled by the groups primely responsible for the intelligence data handling system.

b. If System 438L had a full scale program approved and underway which would insure the data handling capability and intelligence feedback required to efficiently employ the ARS, this theoretical point in the WS 117L program would be on the ground following the electronic and photographic processing which transforms the received signal into photographic form for the Visual System, and records the received signals from the Ferret and Infra-red Systems on magnetic tape.

c. In view of the realistic factors introduced, the WS 117L program requires an Intelligence Data Handling System over and above the present 438L System development plans because of its potential of providing the major collection contribution to all users and the complete lack of an adequate facility equipment, techniques and organization either existing or planned to make use of its product. This IDHS should be custom built around the WS 117L product and operations and must be inherently and completely compatible with the 438L program.

4. Recommendations:

a. The intent of SR No. 5 be followed to plan and develop an Intelligence Data Handling System customized around the WS 117L and its effect on and integration with other intelligence programs.

b. The complete responsibility for the work within this Intelligence Data Handling System area should begin with the theoretical cut-off point outlined above (developed but uninterpreted photography, magnetic tape, etc.) and should be accomplished outside of the Lockheed Aircraft Corporation either by:

(1) A directed subcontract; or

(2) On an associate prime contractor basis.

c. In view of the need for close cooperation and the similarity between this work and the 438L System design and development, a USAF contractor evaluation group should be established to select the sub or associate contractor.

FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L
Technical Operations

[redacted]

~~CONFIDENTIAL~~

[illegible]

[illegible] - WS 117L

FEB 26 1957

[illegible]

[illegible] Corporation, [illegible], California,
[illegible], New York
~~([illegible])~~

2. Requests for proposals are to be sent by WDD/LMS to these concerns by the end of this week. They will use a tentative draft of the [illegible] portion of work statement being prepared for the prime WS 117L contract between the Air Force and Lockheed as the basis for the subcontractors' proposals. Proposals are to be submitted to Lockheed within one month and are to be supplemented by a presentation by each competitor to WDD during the first week in April 1957. WDD will then evaluate these proposals and submit their recommendations to ARDC by mid April 1957. ~~(CONFIDENTIAL)~~

3. In my opinion all three (3) of the concerns cited in paragraph 1, above, are qualified, from an engineering point of view, to submit proposals.

SIGNED

Copy furnished:
WDTS, Lt Col Bogart

FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L
Technical Operations

orig ret'd. to Col Oder 4 Mar 57.
"The winner must be clearly superior and completely documented
[illegible]

DOWNGRADED AT 12 YEAR
ERVALS; NOT AUTOMATICALLY
LASSIFIED. DOD DIR 520[illegible]10

[redacted]

22

8 March 1957

See Ltr 26 Apr 57

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Proposal for WDD Management of 438L

1. The attached letter (Inclosure 1) has been prepared for your coordination and General Schriever's signature.

2. It is the same as the draft you approved with the exception of paragraph 5 b which was revised to conform to General Schriever's policy statement of 5 March 57 as contained in the attached (Inclosure 2) Memorandum for the Record.

3. While the course of action proposed in the letter as the desire of General Schriever does not agree with the recommendation of this office as contained in our staff study, 20 February 57, "Intelligence Data Handling System Support for WS 117L" (Inclosure 3) it is a workable solution.

4. It is my estimate that a net additional four (4) officers and two (2) secretaries will be required to perform the net additional WDD responsibilities proposed in paragraph 5 ~~c~~ of Inclosure 1. System 438L as presently constituted is a very complicated system with a number of bits and pieces plus plans and commitments in many areas such as SAC and USAFE.

Frederic C. E. Oder
FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L
Technical Operations

3 Incls
1. Cy WDD ltr to ARDC (SECRET) WDTR 57-58 4 cys, 12 pp
2. Cy Memo for Record dtd 6 Mar 57, Subj: Policy between WS 117L and 438L (SECRET) WDTR 57-59
3. Cy DF dtd 20 Feb 57, Subj: Intelligence Data Handling System Support for WS 117L (SECRET) WDTR 57-42

When inclosures are withdrawn the classification of this correspondence will be downgraded to UNCL in accordance with AFR 205-1.

USAFE: USAF Europe

57-61

[illegible] is prohibited except with [illegible]mission of the office of origin.

SECURITY CLASSIFICATION

[illegible] RDE PROJECT CARD

TYPE OF REPORT: New Project

REPORT CONTROL SYMBOL: DD-R&E(A)48

1. PROJECT TITLE: ([illegible] TITLE) VISUAL RECONNAISSANCE SUBSYSTEM FOR ADVANCED RECONNAISSANCE SYSTEM, 117L
(UNCLASSIFIED TITLE) SUBSYSTEM E, WS 117L

2. SECURITY: Secret

3. PROJECT NUMBER: 1759

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4. INDEX NUMBER: 2-117L

5. REPORT DATE: 2 April 1957

6. BASIC FIELD OR SUBJECT: Strategic Air Warfare System 117L

7. SUBFIELD OR SUBJECT SUBGROUP: 38-Aerial Photographic Equipment

7A. TECH. OBJ.: SA-9A, 9B, 10, IO-9

8. COGNIZANT AGENCY: Air Research & Development Command

9. DIRECTING AGENCY: Hq, ARDC
Western Development Division

OFFICE SYMBOL: WDTR

TELEPHONE NO.: X-1343

10. REQUESTING AGENCY: Hq USAF

11. PARTICIPATION, COORDINATION, INTEREST

USAF

AMC-P	ACIC-I	USN/CNO-I
APGC-I	ATIC-I	USA/C/S-I
ATC-I		Other CIA/I
SAC-I		
ADC-I		

12. CONTRACTOR AND/OR LABORATORY: Lockheed Aircraft Corporation

CONTRACT/W.O. NO.: AF 04(647)-97

13. RELATED PROJECTS: WS 117L
WS 438L

14. DATE APPROVED:

15. PRIORITY: 1A

16. A(Missiles)

17. EST. COMPL. DATES

RES.	1961
DEV.	1962
TEST	1965
OP. EVAL.	

18. FY	FISCAL ESTS. (M $)
Prev	485M
57	1933M
58	4000M
59	5000M
60	6000M
61-65	23000M
Total	40,418M

19. This is the initial report on this project.

INFORMATION COPY

20. REQUIREMENT AND/OR JUSTIFICATION

The Visual Reconnaissance Subsystem (WS 117L) described in the Development Plan is designed to fulfill the military requirement outlined in General Operating Requirements 80 (SA-2C) dated 11 March 1955 and Systems Requirement 5 dated 17 October 1955. The development of WS 117L was directed by Development Directive 85 dated 3 August 1956 and System Development Directive No. 117L dated 17 August 1956.

The goal of WS 117L as stated in SR #5 is stated as follows:

"Provide continuous (visual, electronic, or other) coverage of the USSR and satellite nations, for surveillance purposes. The timeliness of receipt of the intelligence information is essential, with daily reconnaissance coverage at high resolution the ideal. In consideration of the requirement for earliest availability of the Advanced Reconnaissance System, the engineering progression and Air Force acceptance should be from the lesser to the greater resolution.

"The reso[illegible] surface [illegible] detail should be of the order [illegible] feet or smaller. A capability [illegible] detail to the degree that objects approxi[illegible]mately 20 feet on the [illegible] identified is the optim[illegible]

DD [illegible] 613

to positively identify enemy weapon launching sites and associated activity. If this objective can be met, the many other intelligence requirements of larger surface dimension would automatically be satisfied."

The mission of the Visual Reconnaissance Payload, as specified in SR #5, would be as follows:

"The primary operational mission of the Advanced Reconnaissance System will be to provide pioneer and surveillance reconnaissance coverage of the territories controlled by the USSR and its allies. The system must be capable of obtaining:

(a) Routine target, mapping, pioneer terrain, weather, and photo intelligence data

(b) Bomb damage assessment of high yield weapon strikes"

21a. Military Characteristics

This subsystem provides visual data recording from a satellite vehicle. It includes programming of recording, processing and storage, electronic read-out for transmission of raw data to a ground station, and reconstitution of the raw data into a useable photographic form. This subsystem will function at an orbiting altitude of approximately 300 nautical miles and will resolve objects of approximately 20 foot dimensions with a location accuracy of ≤ 1/10 mile.

21b. Approach

Visual data acquisition will employ conventional aerial photography techniques with special features of automatic chemical processing and television type data read-out in the early vehicles. Also being considered are electrostatic tape and high resolution television with magnetic tape storage. The latter items need development in the state of the art before they could be included in the vehicle payload. The major difficulties to be overcome include: (1) the hazards of high level radiation when nuclear power sources are used (2) the operation in a gravitationless environment (3) the lack of actual environmental information at the operating altitude (4) the development of reliable components capable of operating unattended for long periods of time (5) long term unattended processing of photographic film (6) development of a very accurate slow speed film drive mechanisms which can be corrected from the ground by command signals.

21c. Tasks

(1) Task No: 39812 [illegible] Reconnaissance Camera

(a) [illegible] Contractor: [illegible] Aircraft Corp.
[illegible] Division

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DD Form 613 (Continued)
(S) Visual Reconnaissance Subsystem for Advanced
Reconnaissance System, 117L
(U) Subsystem E, WS 117L

Project: 1759
Date: 2 April 1957

Contract No.: AF 04(647)-97

Sub Contract: Eastman Kodak Co.
Apparatus and Optical
Division

Technical Advisor: Mr. Robert Strasser
WCLRF, WADC

(b) This task covers the development of cameras and lenses for the photographic recording of the target area. A strip type camera using 70 mm film will be developed for the Pioneer and Advanced Vehicles. The camera will have an image motion compensation drive which can be corrected by signals from the vehicle programmer or the ground station. Accurate slow speed film drive mechanisms that can be command corrected will have to be developed. Provisions will also be made for commanding focus adjustments to correct for error introduced due to ascent vibration or uncompensated temperature effects. The lenses which will probably be used are a 6 inch focal length lens for the Pioneer Vehicle and a 36 inch lens for the Advanced Vehicle. The lens speeds will be f/2.8 or faster and the lenses will resolve over 100 lines per millimeter at a 2 to 1 target contrast. Automatic exposure control will be included in order to provide optimum exposure for maximum resolution. Advantage will be taken of the expected vehicle stability to obtain extremely high resolution in flight with an exposure time of approximately 1/100 second on slow speed film. Vehicle attitude information shall be recorded to assist in obtaining location accuracy to 1 mile in the Pioneer Vehicle and 1/2 mile in the Advanced Vehicle.

(c) The development approach will be to provide a gradual increase in capability and flexibility. The camera for the Pioneer Vehicle will be equipped with a 6 inch focal length lens and will be mounted in the vertical position. The Advanced Vehicle camera will have a 36 inch lens and will be steerable to preselected roll axis angles for detailed coverage of specific target areas. The 6 inch focal length lens is presently able to meet the resolution requirements at a lens speed of f/3.5 and is being redesigned to provide approximately the same capability at f/2.8. The 36 inch focal length lens is in the design stages and is expected to meet the resolution requirements.

(2) Task No. 39813 Automatic In Flight
Processing

(a) Prime Contractor: Lockheed Aircraft Corp.
Missile Systems Division

Contract No.: AF 04(647)-97

Sub Contractor: Eastman Kodak Co.
Apparatus and Optical
Division

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DD Form 613 (Continued)
(S) Visual Reconnaissance Subsystem for Advanced
Reconnaissance System, 117L
(U) Subsystem E, WS 117L

Project: 1759
Date: 2 April 1957

Technical Advisor: Mr. Roland Dunker
WCLRD, WADC

(b) This task covers the development of an automatic unattended film processor for use in the satellite vehicle. The processor will consist of the processing chamber, solution storage devices, temperature controls and mechanisms for handling the film and solutions during processing. The component will be able to process automatically when the exposed film equals the capacity of the processor or to process on command from the vehicle programmer when it is desired to read out the acquired data as soon as possible. Techniques and equipment must be developed to permit long time unattended operation in a gravitationless environment and means must be provided for accurate temperature control. The experimental item will process the film around the outside of a drum. The film will be located in a rubber sandwich around the drum and will be clamped at each end. Solutions will be injected into the chamber and rollers moving along the blanket will provide agitation.

(c) Full advantage will be taken of the use of insulation to assist in maintaining an average temperature in the processor. The process itself will be designed for an average temperature than can best be maintained with insulation and supplemental temperature control. An experimental rubber blanket processor has been built and is being tested and evaluated. Information obtained in these tests will assist in arriving at the proper design to go into the vehicle.

(3) Task No. 39814 Automatic Data Readout Equipment

(a) Contractor: Lockheed Aircraft Corp.
Missile Systems Division

Contract No.: AF 04(647)-97

Sub Contractor: Eastman Kodak Co.
Apparatus and Optical Div.

Technical Advisor: Mr. James Huckaby
WCLRW, WADC

(b) The objective of this task is to develop a means of automatically scanning pictorial data recorded on photographic negatives in a satellite vehicle. A scanning light beam will convert the pictorial information into electrical signals which can be systematically transmitted over data communications link to an appropriate ground station. The end product will be film readout devices

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and associated equipments capable of being integrated into the visual reconnaissance subsystems. This equipment will consist of a synchronized film transport mechanism, a concentrated source of light energy capable of being scanned in a suitable geometric pattern by electronic and/or mechanical means, a light detector capable of measuring the instantaneous light flux in the scanning light beam being passed through the film and transfer these measurements as an electrical analog to a video data transmission channel. This item will include the equipment required to accept instructions from the control equipment and perform the functions according to such instructions, the equipment to provide the necessary synchronizing, blanking, and other control functions required for reconstitution of the pictorial information at the ground station. This item will be capable of reading out detail as small as 100 photo lines per millimeter on the film with a minimum loss of information.

(c) The initial approach includes development of a special high resolution line scan cathode ray tube to provide the scanning light source, development of suitable film transport, optical and mechanical scanning components to meet the resolution and other requirements and the design and fabrication of the necessary supporting components such as synchronizing generators, photomultiplier circuitry and video amplifiers. (U)

(4) Task No. 39815 **Subsystem Controls**

(a)	Contractor:	Lockheed Aircraft Corp. Missile Systems Division
	Contract No.:	AF 04(647)-97
	Sub Contractor:	Eastman Kodak Co. Apparatus and Optical Div.
	Technical Advisor:	Mr. Robert Strasser WCLRF, WADC

(b) This task covers the development of control and transport mechanisms for the functioning of the components and the handling of the film in the vehicle. The controls will be able to operate the airborne subsystem from the signals received from the vehicle programmer.

The functions to be performed include (1) maintaining accurate image motion compensation in the camera (2) establishing proper focus for the lens (3) indexing of the film through the camera, processor, and readout (4) operation of the camera, processor, and readout in proper sequence on signals received from the programmer.

(c) The design of the control and transport mechanisms will follow the development of the other components in order to include all the operations and functions that will be necessary. The initial [illegible] will be to consider what [illegible] basic design [illegible] they appear. Integration of all the functions into a final design can be accomplished only when the modes of operation and the configuration of the related components is known.

(5) Task No. 39816 — Ground Processing Equipment

(a) Contractor	Lockheed Aircraft Corp. Missile Systems Division
Contract No.:	AF 04(647)-97
Sub Contractor:	Eastman Kodak Co. Apparatus and Optical Div.
Technical Advisors:	(1) Mr. James Huckaby WCLRN, WADC (2) Mr. Roland Dunker WCLRD, WADC

(b) The objective of this task is to develop means for recording the video output of the Visual Data Link receiver in a form compatible with subsequent operations of the WS 117L Data Processing Subsystem. The end product will be a video-photo recording and film processing device which is capable of being integrated into the Visual Reconnaissance Subsystems. This equipment will consist of cameras suitable for photographing the video data from the output of the Visual Data Link receiver as presented by a cathode ray picture tube or other light transducer and the equipment required to process the exposed film and deliver the developed film as the input to the WS 117L Data Processing Subsystem. This equipment shall include the composite video signal decoding equipment, scanning equipment, control equipment, and other associated equipment as required to make an operational recording and processing device. This item will be capable of accommodating the total information bandwidth of the visual data link and will deliver the primary film record to the Data Processing Subsystems with a minimum time delay and with a minimum loss of reconnaissance information.

(c) The initial approach consists of design, fabrication and tests of a continuous 35 mm strip camera to photograph a line scan presentation of the video data on a cathode ray tube. Film processing will be performed by conventional continuous motion picture film processing techniques. Technical considerations for recording of television programs on film (kinescope recording) will apply to this task.

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DD Form 613 (Continued)
(S) Visual Reconnaissance Subsystem for Advanced
Reconnaissance System, 117L
(U) Subsystem E, WS 117L

Project: 1759
Date: 2 April 1957

#7

(6) Task No. 39821 — Meteoroligical Data Requirements

(a) In House Effort:	Air Force Cambridge Research Center, Atmospheric Analysis Laboratory GRD
Contractor:	Florida State University
Contract No.:	AF 19(605)-1754
Contractor:	Harvard College (Blue Hill Observatory)
Contract No.:	AF 19(604)-1589
Technical Advisor:	Dr. W. K. Widger GRD, AFCRC

(b) The objective of this task is to determine the requirements for meteroligical data collected from a satellite. This will include such factors as (1) minimum and optimum areas of coverage to provide useable information, (2) resolution and photographic scale required for analysis purposes (3) methods for obtaining horizontal cloud velocities and the accuracy required (4) the periodic rate at which coverage must be obtained.

(c) Available cloud pictures obtained from aircraft, balloons, and rockets; and standard synoptic weather data will be studied to determine the requirements that must be met by the data from the satellite vehicle. This task will be terminated when the effort under the present contracts has been transferred to AFCRC Atmospheric Analysis Laboratory.

21d. Other Information

All work involving long focal length lenses, camera designs, and new films and processes for aerial photography above 30,000 feet may be considered collateral activities. However, the unusual environmental conditions are not met by presently available equipment. Furthermore, film-television equipment has not been called upon to meet the exacting demands of recovering such amounts of information in aerial reconnaissance missions.

In order to provide an alternate to conventional photographic electronic read-out system and, possibly, to provide a system less vulnerable to nuclear radiation, research and development will be pursued on other methods of data acquisition and storage. These will include electrostatic photography and high resolution television with magnetic tape storage.

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DD Form 613 (Continued) Project: 1759
(S) Visual Reconnaissance Subsystem for Advanced Date: 2 April 1957
Reconnaissance System, 117L
(U) Subsystem E, WS 117L

21e. Background History

A feasibility study on the use of a satellite vehicle for reconnaissance purposes was conducted by the Rand Corporation. The results of this study led to design studies conducted by Lockheed Aircraft Corporation, Radio Corporation of America, and Glenn L. Martin Aircraft Company. The design studies indicated three possible approaches to the reconnaissance problems and the photographic approach proposed by the Lockheed Aircraft Corporation was selected. The approach as outlined in this document follows closely the original proposal.

21f. Future Plans

Design and development work will be continued to produce the experimental model of the components. These will be tested and evaluated for performance and compatibility. Information obtained here will be incorporated into the design of the prototype models.

The research and development effort on other visual reconnaissance methods is being conducted at Wright Air Development Center (WCLRW) under Project 4123 TV Reconnaissance techniques and 6219 Special Sensors. These projects cover the developments on electrostatic tape, high resolution television with magnetic tape storage, and light amplification. These developments will be considered for inclusion in the Visual Reconnaissance Vehicle when the state of the art has advanced to a point where these equipments and techniques could meet the requirements of WS 117L.

21g. References

1. GOR-80 (SA-2c), 11 March 1955
2. SR 5, 17 October 1955
3. DD 85, 3 August 1956
4. SDD 117L, 17 August 1956

Rand Corporation Reports

5. R-217, April 1951
6. R-262, February 1954
7. Final Report Contract No. AF 33(616)-3104, Radio Corporation of America
8. Final Report, Contract No. AF 33(616)-3105, Lockheed Aircraft Corp.

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DD Form 613 (Continued)
(S) Visual Reconnaissance Subsystem for Advanced
Reconnaissance System, 117L
(U) Subsystem E, WS 117L

Project: 1759
Date: 2 April 1957

9. Final Report, Contract No. AF 33(616)-3106, Glenn L. Martin Aircraft Co.

10. Monthly and Quarterly Reports, Contract No. AF 04(647)-97
Lockheed Aircraft Corporation

21h. Coordination and Signature Block

Edward J Conway
EDWARD J. CONWAY
Major, USAF
Project Engineer

FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L

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R & D SCHEDULE

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

DATE 2 Ap[illegible] 1957

[illegible]) VISUAL RECONNAISSANCE SUBSYSTEM FOR ARS, WS 117L
([illegible]CLASSIFIED TITLE) SUBSYSTEM E, WS 117L

INITIAL ☒
CHANGE ☐

NUMBER 1759

CALENDAR YEARS

SCHEDULE	PROJECT OR TASK NR	1956						1957												1958								1959				1960				1961				19 COMPL			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
[illegible] 117L	1759				A																													B				C	D	O	P		
[illegible] Camera	39812				A																																						
Pioneer																									B					C	D	O	P					E					
Advanced																														B				C	D	O	P					E	
Surveillance																																		B				C	D	O	P		
[illegible] Processing	39813				A																																						
Pioneer																									B					C	D	O	P					E					
Advanced																														B				C	D	O	P					E	
Surveillance																																		B				C	D	O	P		
[illegible] Data Readout Equip	39814				A																																						
Pioneer																									B					C	D	O	P					E					
Advanced																														B				C	D	O	P					E	
Surveillance																																		B				C	D	O	P		
Subsystem Controls	39815				A																																						
Pioneer																									B					C	D	O	P					E					
Advanced																														B				C	D	O	P					E	
Surveillance																																						C	D	O	P		
[illegible] Processing Equipment	39816				A																																						
Pioneer																									B					C	D	O	P						E				
Advanced																														B				C	D	O	P					E	
Surveillance																																						C	D	O	P		
[illegible] Data Rqmts.	39821													A																													
[illegible] Estimates																																											

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

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R & D SCHEDULE

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

[illegible] VISUAL RECONNAISSANCE SUBSYSTEM FOR ARS, WS 117L
[illegible] TITLE) SUBSYSTEM E, WS 117L

INITIAL ☒
CHANGE

DATE
2 April 1957

NUMBER
1759

CALENDAR YEARS

[illegible] SCHEDULE	PROJECT OR TASK NR	19 63						19 64												19 65								19				19				19				TO COMPL.			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
[illegible] WS 117L	1759														E						J			K																			
[illegible] Camera	39812														E						J			K																			
[illegible] Surveillance																																											
[illegible]tic In Flight Processing	39813																																										
[illegible] Surveillance															E						J			K																			
Automatic Data Readout Equip.	39814																																										
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Subsystem Controls	39815																																										
[illegible] Surveillance															E						J			K																			
[illegible] Processing Equip.																																											
[illegible] Surveillance	39816														E						J			K																			

[illegible] Awarded
[illegible] of Development Model Started (Prototype Flight Article)
[illegible] Model Fabrication Completed (Prototype Flight Article)
[illegible] of Contractor Compliance Testing of Development Model (Acceptance Test).
[illegible] Test Starts
[illegible]tion with First Flight (Completion of Ground Test)
[illegible] of Functional Testing of Development Model to Demonstrate Capability (Flight Test Approval)
[illegible] of Procurement Data (End)
[illegible] Production Engineering (End)

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FORM [illegible] 103 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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R & D MANPOWER ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

WS 117L

INITIAL ☒

CHANGE

DATE 2 April 1957

NUMBER 1759

ORGANIZATION TITLE	TYPE ORG	ACTUAL MAN-QTRS LAST QTR	PROJECTED DIRECT MAN-YEARS						
			FY 1957		FY 1958		FY 1959	FY 1960	TO COMPL
			AVAL	RQRD	AVAL	RQRD	RQRD	RQRD	RQRD
WS 117L Project Office, WDD	R	1.0	1.0	1.0	1.0	1.0	2.0	2.0	
Aerial Reconnaissance Lab,WADC	R	1.7	0.7	1.5	0.7	1.5	1.5	1.5	
Atmospheric Analysis Lab,AFCRC	R	2.5	3.6	3.6	-	-	-		
Total		4.2	5.3	6.1	1.7	2.5	3.5	3.5	17.5
Total Manpower Dollars		7,634	38,584	44,408	12,376	18,200	25,250	25,250	127,400
Continuing Requirement									

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R & D CONTRACT FUNDS ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

PAGE	OF
DATE	2 April 1957
NUMBER	1759

[illegible] (VISUAL RECONNAISSANCE SUBSYSTEM FOR ARS, WS117L

[illegible] TITLE) SUBSYSTEM E, WS 117L

INITIAL ☒

CHANGE

	PROJ OR TASK NR	END ITEM CAT	CONTRACT NUMBER	BPSN	PREV YRS		FY 57		FY 58		FY 59		FY 60		TO COMPL	
					600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER
[illegible] 117L	P-1759	E	AF04(647)-97	2-117	485M	-	1933M		4000M		5000M		6000M		23000M	
				P-100 Funds:						1000M		1500M		3600M		22500
				P-200 Funds:				60M		600M		600M		400M		2500
			Sub-Total:													
				P-600	485M		1933M		4000M		5000M		6000M		23000M	
				P-100						1000M		1500M		3600M		22500
				P-200				60M		600M		600M		400M		2500
TOTAL					485M		1933M	60M	4000M	1600M	5000M	2100M	6000M	4000M	23000M	[illegible]

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R & D COST ESTIMATE RECAPITULATION

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

WS 117L

INITIAL ☒ CHANGE

PAGE OF PAGES

DATE 2 April 1957

NUMBER 1759

		A. PREVIOUS YEARS		B. FISCAL YEAR 57		C. FISCAL YEAR 58		D. FISCAL YEAR 59		E. TO COMPLETE	
		000	OTHER	000	OTHER	000	OTHER	000	OTHER	000	OTHER
	TAL	485M		1933M	60M	4000M	1600M	5000M	2100M	29000M	29000M
	AILABLE	485M		1933M							
	NEW REQ										
	a. TOTAL				60M	4000M	1600M	5000M	2100M	29000M	29000M
	b. AVAILABLE										
	NEW REQ										
		7.6M		44.4M		12.4M		18.2M		177.9M	
		N/A									
		N/A									
AIRCRAFT		N/A.									
		485M		1933M	60M	4000M	1600M	5000M	2100M	29000M	29000M
TOTAL		492.6M		2037.4M		5612.4M		7118.2M		5817[illegible]	

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SECRET

[redacted]

VISUAL RECONNAISSANCE SUBSYSTEM FOR ARS, WS 117L

GENERAL DESIGN SPECIFICATION

a. Statement of the Problem

The problem to be solved in this program is the development of a reconnaissance subsystem for the acquisition of visual data from a satellite vehicle and the presentation of this data in a useable form on the ground. The unconventional operational conditions present unique problems that must be solved such as (1) the long time unattended operation, (2) unknown environment conditions, (3) operation in a gravitationless environment.

b. Approach

The approach to the problem was determined by feasibility studies conducted by the Rand Corporation and design studies conducted by Lockheed Aircraft Corporation, Glenn L Martin Aircraft Company, and The Radio Corporation of America. Evaluation of the design studies resulted in the choice of the approach proposed by Lockheed Aircraft Corporation.

c. Solution

The Visual Reconnaissance Subsystem will provide photographic coverage of preselected areas of the USSR and satellite nations on a daily basis from the orbiting WS 117L vehicles. The vehicles will orbit at a 300 nautical mile altitude at a velocity of 25,000 feet per second. The functions involved will be:

1. Programmed photographic recording of the selected target areas
2. Processing and storage of the recorded data
3. Readout and transmission of the raw data to ground intercept stations on a command signal from the station
4. Ground processing of the raw data into a useable form.

The development will proceed through three versions of the Visual subsystems each with increased capability. These subsystems are visualized as follows:

Pioneer Visual Subsystem

The aim of the Pioneer Vehicle is to provide an early reconnaissance capability. A photographic camera will be utilized to obtain coverage of 100 by 1500 nautical miles per daylight orbit. The film will be automatically processed while the vehicle is passing from unfriendly territory to within range of the data acquisition station. The processed film will be read out by television techniques and transmitted to the ground station. The raw data will be reconstituted at the ground station into a useable form.

The Pioneer Subsystem w[illegible] to detect a 100 foot ground [illegible] useful li[illegible] [illegible] upon [illegible]

Advanced Visual Subsystem

The Advanced Subsystem will have a longer life and higher resolution than the Pioneer. The vehicle is expected to have a useful life of 60 to 90 days and the subsystem will be capable of detecting 20 foot ground objects. The Advanced Subsystem will have longer focal length lenses and the cameras will be steerable to preselected and programmed targets.

Surveillance Visual Subsystem

The Surveillance Vehicle will be designed for a useful life of approximately one year. Multiple camera installations will be individually steerable to preselected and programmed targets. The use of multiple vehicles will provide daily coverage of the desired areas. The Surveillance Subsystem will be capable of identifying 20 foot ground objects. Other than photographic methods will be considered for these vehicles including: high resolution television with magnetic tape storage, electrostatic photography, and light amplification for operating under low level light conditions.

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1

R & D SCHEDULE

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

3. DATE 2 April 1957

4. TITLE: ~~(SECRET TITLE)~~ ELECTRONIC RECONNAISSANCE SUBSYSTEM FOR ARS, WS 117L (UNCLASSIFIED TITLE) SUBSYSTEM F, WS 117L

5. INITIAL ☒ CHANGE

6. NUMBER 1760

SCHEDULE		CALENDAR YEARS																																									
TITLE	PROJECT OR TASK NR.	1956						1957												1958								1959				1960				1961				62 TO COMPL			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
[illegible]stem F, WS117L	1760															R																					Q	E		C	D	O	
[illegible] Ferret Recon Equip	T 39822				A											R												Q	E		C	D	O			P					F		
[illegible]ced Ferret Recon Equip	T 39823				A											R																		Q	E		C	D	O		P		
[illegible]lance Ferret Recon Equip	T 39824				A											R																					QE			C	D	O	

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R & D SCHEDULE

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

3. DATE 2 April 1957

TITLE (~~SECRET TITLE~~) ELECTRONIC RECONNAISSANCE SUBSYSTEM FOR ARS, WS 117L
(UNCLASSIFIED TITLE) SUBSYSTEM F, WS 117L

5. INITIAL ☒
CHANGE ☐

6. NUMBER 1760

SCHEDULE		CALENDAR YEARS																																							
TITLE	PROJECT OR TASK NR	19						19 63												19 64								19 65				19				19				TO COMPL.			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Subsystem F	1760											P																	E														
																													J														
																													K														
Pioneer Ferret Recon Equip	T-39822																																										
Advanced Ferret Recon Equip	T-39823											E																															
												J																															
												K																															
Surveillance Ferret Recon Equip	T-39824											P																	E														
																													J														
																													K														

[illegible]:

A - Contract awarded
B - Fabrication of development model started (Prototype flight article)
C - Development model fabrication completed (Prototype flight article)
D - End of contractor compliance testing of development model (Acceptance test)
O - Ground Test starts
P - Integration with first flight (Completion of ground test)
E - Completion of functional testing of development model to demonstrate capability (After flight test approval)
J - Preparation of procurement data (End)
K - Production Engineering (End)
Q - Design studies completed.
R - Engineering Analysis Report

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~~[illegible]~~ 65 —

R & D MANPOWER ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

PAGE 1 OF 1 PAGES

3. DATE 2 April 1957

UNCLASSIFIED TITLE SUBSYSTEM F, WS 117L

6. INITIAL ☒ CHANGE

4. NUMBER 1760

7. ORG COMP CODE	8. ORGANIZATION TITLE	9. TYPE ORG	10. ACTUAL MAN-QTRS LAST QTR	11. PROJECTED DIRECT MAN-YEARS						
				FY 19 57		FY 19 58		FY 1959	FY 19 60	TO COMPL
				AVAL	RQRD	AVAL	RQRD	RQRD	RQRD	RQRD
WDTR	WS 117L Project Office, WDD	R	0.5	0.5	1.0	0.5	1.0	2.0	2.0	
WCLR	Aerial Reconnaissance Laboratory, WADC	R	0.5	0.5	1.0	0.5	1.0	1.0	1.0	*
	TOTAL:		1.0	1.0	2.0	1.0	2.0	3.0	3.0	*
	TOTAL MANPOWER DOLLARS:		1,820	7,280	14,560	7,280	14,560	24,840	24,840	124,200

*Indicates continuing requirement

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R & D CONTRACT FUNDS ANNEX

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

PAGE OF PAGES

3. DATE 2 April 1957

4. TITLE
~~(SECRET TITLE)~~ ELECTRONIC SUBSYSTEM FOR ARS, WS 117L
(UNCLASSIFIED TITLE) SUBSYSTEM F, WS 117L

5. INITIAL ☐ CHANGE

6. NUMBER 1760

7. ITEM	8. PROJ OR TASK NR	9. END ITEM CAT	10. CONTRACT NUMBER	11. SPEN	12. PREV YRS		13. FY 57		14. FY 58		15. FY 59		16. FY 60		17. TO COMPL	
					600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER
Subsystem F, WS 117L	1760	E	AF04(647)-97	2-117	374M		633M		1200M		4500M		4500M		13000M	
			P-100	Funds:								350M		2300M		11500M
			P-200	Funds				30M		600M		600M		400M		1000M
		SUBTOTALS:														
			P-600		374M		633M		1200M		4500M		4500M		13000M	
			P-100									350M		2300M		11500M
			P-200					30M		600M		600M		400M		1000M
TOTAL					374		633 M	30 M	1200 M	600 M	4500 M	950 M	4500 M	2700 M	13000 M	22500 M

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R & D COST ESTIMATE RECAPITULATION

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

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UNCLASSIFIED TITLE
SUBSYSTEM F, WS 117L

5. INITIAL ☒ CHANGE

DATE
2 April 1957

6. NUMBER
1760

ITEM		A. PREVIOUS YEARS		B. FISCAL YEAR 57		C. FISCAL YEAR 58		D. FISCAL YEAR 59		E. TO COMPLETE 65	
		[illegible]	OTHER	[illegible]	OTHER	[illegible]	OTHER	[illegible]	OTHER	[illegible]	OTHER
CONTRACT	A. TOTAL	374M		633M	30M	1200M	600M	4500M	950M	17500M	15200M
	B. AVAILABLE	374M		633M							
	C. NEW REQ										
MATERIEL	A. TOTAL				30M		600M	4500M	950M	17500M	15200M
	B. AVAILABLE										
	C. NEW REQ										
FACILITIES											
MANPOWER		1.8M		14.6M		14.6M		24.8M		149.0M	
TRAINING		Not Applicable									
TEST ITEMS		Not Applicable									
TEST SUPPORT AIRCRAFT		Not Applicable									
SUBTOTAL		374M		633M	30M	1200M	600M	4500M	950M	17500M	15200M
TOTAL		375.8M		677.6M		1814.6M		5474.8M		32849.0M	

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Subsystem F - ELECTRONIC RECONNAISSANCE

Tab 1 - General Design Specification

I. General

A. Statement of the Problem

An earth satellite would provide a platform from which hitherto inaccessible portions of the Soviet Bloc nations could be subjected to surveillance of various types. The problem for the ferret subsystem is to design equipment which will overcome the severe environmental and payload restrictions and which will obtain such data concerning electromagnetic signals as will provide the maximum possible intelligence information.

B. Approach

The design of a system to obtain electronic reconnaissance information from a satellite vehicle requires the sub-division of the over-all effort into missions. These missions must then be ordered in priority such that, in general, the most useful information will be obtained first.

Equipment design may then be optimized for each mission and separate equipment may be designed for each if necessary. The ordering of missions should be such that information obtained from early missions will provide guidance in the design of equipment and establishment of objectives for later missions. In every case, the missions will be predicated upon intelligence needs and not necessarily upon equipment availability.

The general procedure must be as follows:

1. Define intelligence objective.

2. Determine which objectives can be best met by satellite reconnaissance.

3. Determine parameters and accuracies required to meet objectives.

4. Specify and develop equipment compatible with the physical environment that is within the state of the art to receive, detect, analyze and record the measured parameters within the desired accuracy, such as:

    a. Antennas.

    b. Receivers

    c. Analysis and Recording Systems

    d. Programmer requirements

Tab 1 - General Design Specification (cont.)

C. Expected Results

1. Will provide an initial electronic reconnaissance system that is compatible with the physical environment, and that will yield useful intelligence data.

2. Will determine where the state of the art must be advanced (and physical limitations overcome) to satisfy all intelligence requirements placed on this sub-system.

II. Description

A. Intelligence Requirements

The reasons for preferring [redacted] are that, first, it is known that there are many signals in this part of the spectrum which can be used as calibrating or test signals and in effect give notice that the whole equipment is functioning. Second, there is every reason to believe that the national intelligence effort will benefit from knowing that there are signals in [redacted] from geographical areas that are now inaccessible to us. There is no point in using the satellite to record signals from satellite border areas, or along the China coast since adequate coverage is given by other collection methods.

[redacted]

[redacted]

[redacted]

B. Antennas

Physical limitations restrict the number of antennas on any one vehicle. Suggested antenna configurations to implement the above intelligence requirements are as follows:

[redacted]

Tab 1 - General Design Specification (cont.)

[redacted]

C. Power Supply

The only type of power supplies expected to be definitely available and proven by the time of the Pioneer system will be primary batteries. Weight of the best available will be in the order of 1800 pounds for a capability of 200 watts for 20 days continuous operation. Availability of the radio isotope power supply with batteries will enable the use of higher power for a longer operating time but will present problems concerned with radiation damage, induced circuit noise, and heat removal.

D. Receivers

Power consumption keeps receiver sophistication to a minimum. If certain frequency bands are chosen, TWT (traveling wave tubes) development to produce a suitable tube with permanent magnet focusing will be required.

[redacted]

E. Data Analysis and Recording

Power consumption and weight considerations demand maximum simplification of analysis and storage processes to be performed in the satellite. Satellite analysis should be limited to essentially an encoding process with recorder or storage requirements being limited to multiple channel, narrow bandwidth, e.g., 10 kc/s. Requirements for the data analysis equipment are described briefly in the task outlines.

F. Telemetering Equipment

The telemetering system will make use of present standards and techniques. No major technical problems exist here and no minimum specifications are required at this stage of development.

G. Physical Environment

All estimates and calculations have been made on the basis of existing and predicted knowledge and are all subject to modification by projected experiments.

AF-WP-L-29 MAY 53 5M

Subsystem I

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SECURITY CLASSIFICATION

59 of 85

RDB PROJECT CARD

TYPE OF REPORT: NEW PROJECT

REPORTS CONTROL SYMBOL DD-RDB(A)48

1. PROJECT TITLE: (UNCLASSIFIED TITLE) DATA PROCESSING SUBSYSTEM FOR ARS WS-117L
Sub system I

2. SECURITY: ~~SECRET~~

3. PROJECT NUMBER: 1763 25

4. INDEX NUMBER: 2-117L

5. REPORT DATE: 2 April 1957

6. BASIC FIELD OR SUBJECT: Strategic Air Warfare System 117L

7. SUBFIELD OR SUBJECT SUBGROUP: 39. Recon Interpretation and Computation.

7A. TECH. OBJ.: SA-9A, 9B
10
IO-9

8. COGNIZANT AGENCY: Air Research & Development Command

9. DIRECTING AGENCY: HQ ARDC WESTERN DEVELOPMENT DIVISION (WDD)

OFFICE SYMBOL: WDTR

TELEPHONE NO.: Or2-0171 X1326

10. REQUESTING AGENCY: HEADQUARTERS USAF

11. PARTICIPATION, COORDINATION, INTEREST:
USAF/AMC-P   AFOIN,HQ,USAF-I
APGC-I   AFSS-I USA/C/S-I
ACIC-I
SAC-I   TAC-I   Other: CIA-I
ADC-I   USN/CNO-I

12. CONTRACTOR AND/OR LABORATORY: SEC. 21. C

CONTRACT/W.O. NO.: NONE

13. RELATED PROJECTS:
WS-117L
WS-[illegible]38L

14. DATE APPROVED:

15. PRIORITY: 1A

16. (MISSILES)

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17. EST. COMPL. DATES

RES.	1961
DEV.	1963
TEST	1965
OP. EVAL.	

18. FY	FISCAL ESTS. (M $)
REV.	503M
57	969M
58	7000M
59	5000M
60	6000M
61-65	13000M
Total	285[illegible]

19.
This is the initial Report on this Project.

20. REQUIREMENT AND/OR JUSTIFICATION

GOR No. 80 (SM-2C) dated 16 March 1955 and SR No. 5 dated 17 October 1955 establishes the requirement for an Air Force Intelligence Data Handling System capable of accepting and processing visual, ferret and infrared data from Satellite reconnaissance vehicles. Reconnaissance Satellites are expected to provide a much greater number of "pieces" ofintelligence than is being collected evaluated and analyzed today, or which is anticipated to be collected by other systems in the near future. This great increase in quantity of collected data will overtax the present intelligence data handling system at a time when timeliness of information is of mounting importance. A data handling system must therefore be especially designed and developed around the characteristics of this collection system to minimize the time needed to produce meaningful intelligence from the collected raw data. The requirement can ultimately be best satisfied through the planned exploitation of automation, mechanization electronics miniturization and modern production type techniques.

Development Directive No. 85, dated 3 August 1956, and System Development Directive No. 117L, dated 17 August 1956, direct the development of an Intelligence Data Processing Subsystem which is:

22. RDB   SN   [illegible]   IC & P   [illegible]   C

SECRET

[illegible] AT 12 YEAR [illegible]

PAGE [illegible] PAGES

a. Tailored to the collection characteristics and capabilities of the reconnaissance satellite,

b. Designed to centrally provide for rapid and efficient processing and dissemination of all satellite collected data in a manner which best satisfies user requirements.

21. Brief and Military Characteristics

This project covers the design and development of a completely integrated Intelligence Data Processing Subsystem including the equipment, techniques and procedures to transform recorded, raw, photographic, ferret and infrared data into useful intelligence. This data processing subsystem will incorporate timely intelligence feedback from other intelligence collection systems and agencies to insure:

a. Best operational employment of the satellite collection capabilities.

b. Optimum extraction of information from the raw data collected.

Data will be acquired from the satellite through radio transmission channels and reception at ground receiving stations. The ground receiving stations will identify, record, and retransmit this information to a central point, for simplicity termed the ARSIC (Advance Reconnaissance System Intelligence Center). The Intelligence Data Processing Subsystem located primarily within the ARSIC will be capable of all functions necessary to transform the recorded raw data into useful intelligence. The functional areas which must be investigated and considered to insure the efficient production and availability of intelligence in the forms, frequencies and quantities desired by various users are: processing, screening, interpretation, collation, evaluation, indexing, storage and retrieval, analysis, display, dissemination and presentation.

Development of this subsystem must make maximum use of the Intelligence Data Processing Subsystem design concept, equipment, techniques, and procedures recommended and/or under development in support of System 438L, "USAF Intelligence Data Handling System". It appears that some of these techniques and equipments will meet some of the needs of this subsystem.

21b Approach

The WS-117L is being developed on a development schedule phased over a period of years and including a variety of configurations, capabilities, and useful vehicle life spans. It is planned to develop the Data Processing Subsystem on an orderly growth basis which is phased to the collection capabilities and operational ability of the system.

To be realistic, the design and development of the subsystem must be founded upon:

(1) A definition and/or simulation of the raw data (end product) of the collection subsystems,

(2) An analysis of the uses of these defined end products; i.e., who wants what information, for what use, how often, and in what form.

Each separate use of the data must be studied to determine the processing steps involved from the initial receipt of the raw data through the production of a finished output which best satisfies that use. Once the end products of the collection subsystems are defined, a design for efficiently processing the information can be sensibly conceived. Simultaneously, research effort must be initiated to attack technical problems that threaten the development of vitally needed equipments. Large scale equipment development efforts will normally follow the completion and be guided by the system design framework and the results of the Equipment Application and Techniques Exploration Task. Following the equipment development and testing, the components will be combined, installed, and tested as a system to point out the final modifications and debugging required before it is operationally ready.

In order to meet the changing capabilities of the collection systems it will be necessary to conduct a continuing research and technical development effort on techniques and procedures for application to the more advanced facilities. The concept of the initial data handling center is one of relative simplicity. Limited amounts of mechanization and automation will be adequate to handle efficiently the early data yields of the ARS. This will provide the capacity for the orderly evaluation and development of more complex components to meet more stringent requirements as the system grows.

c. Tasks

The areas which will require development effort have been divided into general functional areas as listed below. As work progresses these tasks will require expansion to reflect various intelligence functional areas and/or to relate the development work required to the particular sensing technique employed. Operational characteristics, to the degree possible at this time, are included in the general design specification of the development plan.

(1) Task No. 39856 - Simulation of ARS Data Input

Contractor: Not Yet Determined

Technical Advisor: Mr. F. Kelly, RCWIO, Intelligence Laboratory
RADC, Rome, New York

The objective of this task is to realistically simulate all types of predicted end products of the successive collection versions of this system. These simulated end products should include the range of resolution, cover repetition and quantity values anticipated or possible. This data is fundamental in determining the usefulness of the raw data to the variety of potential users, and, consequently, the requirements for the processing involved. Results of this phase of the work will be the basis for the final design of the data-handling system and will determine the procedures and characteristics of the equipment needed to best satisfy the data processing requirements for each subsequent version of the reconnaissance vehicles.

(2) Task No. 39857 - Intelligence Data Processing System Design

Contractor: Not Yet Determined

Technical Advisor: Mr. R. Libby, RCWI, Intelligence Laboratory,
Rome, New York

This task embraces the study work required to produce a design of a Subsystem (including procedures, equipment and technique) to efficiently transform the collected raw data into useable intelligence. Basic input data to this design study effort will be supplied in part by the simulation task. Possible uses of the collected product against the intelligence needs of major elements of the intelligence community as well as such factors as operational desirability, technical feasibility, and logistic supportability will be considered in arriving at the preferred system design.

(3) Task No. 39858 - Equipment Application and Technique Experimentation

Contractor: Not Yet Determined

Technical Advisor: 1st/Lt. A. Buckland, RCWIO, RADC, Rome, New York.

The objective of this task is to provide a source of technical know-how for individual application to the variety of functions and processes included within this subsystem and to single out apparent shoke points in the data handling system against which investigative effort should be concentrated. It will provide input to the systems design group concerning the feasibility of techniques and equipments which exist or can be developed and made available for systems integration. The output of this task will be reports and technical data to form the basis for:

(a) Selection and modification of existing commerical and in-development equipment.

(b) the performance characteristics and specifications of the development items required, including the optimum technical approach.

(4) Task No. 39859 - Equipment Development

Contractor: Not Yet Determined

Technical Advisor: Mr. F. Kelly, RCWIO, Intelligence Laboratory,
RADC, Rome, New York

The objective of this task is to actively develop those hardware items which are not commercially available or in development, but required by this sub-system. Included will be modifications to existing equipment when appropriate to insure their maximum applicability. Guidance on the items to be developed and their functional specifications will stem from the Systems Design Task and the Equipment Application and Technique Experimentation task.

(5) Task No.39860 - Intelligence Data Processing Subsystem Integration and Test

Contractor: Not Yet Determined

Technical Advisor: Mr. R. Libby, RCWI, Intelligence Laboratory,
RADC, Rome, New York

The objective of this task is the accomplishment of the overall contractor systems management functions to insure its operational availability, prescribed performance, and its working integration with the other parts of the intelligence system. It will include but not be limited to: the systems engineering, complete installation and equipping of the ARSIC, and the combined test of all individual items which comprise this subsystem under simulated and operational uses. Command Post Exercises (CPX) using products of the simulation program as well as test run data from the functional test of the visual, ferret, and infrared subsystems for input data will be accomplished to checkout and modify the individual component and overall subsystem procedures, operation, and performance.

(6) Task No. 39855 - Intelligence Parameters and Data Processing Subsystem Criteria Studies

Contractors: Planning Research Corporation
10966 LaConte Avenue
Los Angeles, California

Aero Services Corporation
210 East Courtland Street
Philadelphia, Pennsylvania

Physical Research Laboratory, Boston University
707 Commonwealth Avenue
Boston, Massachusetts

Ohio State University
Columbus, Ohio

Battelle Memorial Institute
505 King Avenue
Columbus, Ohio

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UNCLASSIFIED TITLE: Data Processing Subsystem for ARS WS-117L 2 April 1957
Proj 1763

Broadview Research and Development
1127 Chula Vista Avenue
Burlingame, California

Task Engineer:

Mr. Frank Kelly, RCWIO
Intelligence Laboratory
RADC, Rome, New York

Task Technical Advisors:

Major W. E. Callanan, RCWIR
1/Lt. L. R. Buckland, RCWOO
1/Lt. R. E. Moss, RCWIO
Mr. A. L. Downing, RCWIP

Intelligence Laboratory
RADC, Rome, New York

Objective:

This task will provide analytical data as an input to the WS-117L Planning function to determine intelligence requirements and design criteria. It is aimed at determining the optimum detail, volume, and accuracy of the "sightings" to be made by the reconnaissance sensing equipments, by spelling out the information requirements of the users and translating these into meaningful quantitative terms and specifications. Effort will also be devoted to those areas relating the human behavioral characteristics to the intelligence processing and analysis functions. This study will include the exploration of possible applications of machine techniques for the automation of the "non-judgment" work areas within these functions.

(7) Task No. 39861 - Personnel, Training and Human Engineering Support

Contractor: Initially an In-House Effort. Eventaul contractor not yet determined.

Task Engineer: Dr. P. Bersh, RCSH, Human Factors Laboratory, RADC, Rome, New York

The objective of this task is to provide all necessary human engineering support for the Data Processing Subsystem. This task will develop criteria and specifications for training techniques, equipment, and simulators. It will also include the production of Qualitative Personnel Requirements Information (QPRI) covering all analysis, interpretation, operator and maintenance jobs required for the operational employment of this subsystem. The Data Processing Subsystem is extremely complex and, hence, the design of equipment and the integration of components into larger units must be accomplished in a manner which takes full cognizance of human capabilities and limitations. The gains to be achieved by appropriate human engineering will include:

(a) increased operational and maintenance efficiency.

(b) reduction in the required time and complexity of training

(c) more timely and efficient processing of information throughout the entire subsystem.

d. (1) There will be no development duplication between this subsystem and systems 438L, 456, and 461L, but rather considerable effort will be made to take advantage and exploit the similarities of the programs for maximum trade off of the attained equipments and techniques. This subsystem will be made completely compatible with system 438L, and when operational, these systems will be mutually supporting and complimentary in nature.

(2) The operational employment of this system will require that the number of photographic interpreters and intelligence specialist trainees be increased, and the new techniques resulting from this development may require modification and expansion of the existing training programs.

e. Background History

The concept for using a satellite vehicle as a platform for reconnaissance equipment can be considered as the natural outgrowth of the requirement for obtaining intelligence information of a potential enemy whose area and security preclude its effective collection by ordinary aerial reconnaissance or other means. The need for timely and continuous intelligence information to assess a potential enemy's capabilities and probable intent has become more critical as the advancement of technology has given them offensive weapons with intercontinental range and greater destructive powers. The impetus which motivated the military establishment to foster work on new methods for collection of intelligence information came from the realization that current reliable pre-hostilities intelligence is required to insure proper direction of National Planning in development of effective counter-force weapons and counter-force strategy. The results of the numerous studies conducted since 1946 at the direction of the Department of Defense concluded that a Satellite Intelligence System was feasible and would satisfy to a great extent the requirement for intelligence information to aid the national planners in making decisions pertaining to counter-force strategy and development of effective measures against possible attack.

The concept of the Advanced Reconnaissance System is a result of studies conducted at the RAND Corporation. A study completed in 1947 together with similar investigations by other contractors concluded that a satellite vehicle was feasible as a reconnaissance vehicle but not as a weapon carrier. In 1950, the Research and Development Board vested satellite custody in the Air Force, and RAND was directed to explore its possible military utility.

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Recommendations for an expanded study of reconnaissance applications were made to the Air Staff in late 1950 and a formal report (RAND-217) followed in April 1951. Feasibility studies for critical subsystem initiated at that time were television (RCA), attitude control (North American Aviation), nuclear auxiliar power units (Bendix Aviation, Frederick Flader, Allis Chalmers, and Vitro Corporation).

Recommendations for the ARS development were made by RAND in November 1953, and these were followed by the final report (Rand-262) in February 1954. The Air Force requirement was written August 1954. Requests for proposal for systems studies were made March 1955, and the studies leading to this development plan began in June 1955 and were completed in June 1956.

The present concept of operation of the Satellite Intelligence Center was evolved as a combined effort of the Intelligence Laboratory, RADC, and the various Air Force commands. As the development of the system progresses, the concept of operations may be re-evaluated in light of changing requirements with modifications anticipated.

f. Future Plans

The extent of future plans is outlined in Tab 1, General Design Specifications. Revisions to the basic plan will be accomplished throughout the development cycle to insure timely and valid decisions.

g. References

1. RAND Corporation Report R-217, April 1951.

2. RAND Corporation Report R-262, February 1954.

3. Systems Requirement No. 5 dated 27 November 1954, revised 17 October 1955.

4. GOR No. 80 (SA-2C) dated 16 March 1955.

5. DD Form 613, entitled "Advance Reconnaissance System: Project No. 1115", dated 19 April 1955, RCS: DD-R&D/A/119.

6. Project 1115, Task 15000 (Uncl) "Intelligence Parameters Study for Advanced Reconnaissance System".

7. Project 1115, Task 15001 (Uncl) "Study of Intelligence Processing Methods for Advanced Reconnaissance System."

8. RADC Document entitled (Uncl) "Intelligence Requirements as Developed for the 1960-65 Time Period," dated 1 June 1955, Control Nr NI-2443.

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9. ATIC Document entitled (Uncl) "Technical Intelligence Considerations for Advanced Reconnaissance System 1115," dated 11 October 1955, Control Nr. T55-18539.

10. ACIC Document entitled (Uncl) "Study of Position Information Needs," dated 1 April 1955, control Nr. D5-6800-1.

11. Document entitled (Uncl) "United States Air Force Indications Plan" (Short title - USAFIP), dated 16 November 1955, prepared by the Directorate of Intelligence, HQ. USAF, Washington, D. C., Control Nr. NR. NI-5986. (Collection Plan covering strategic Warning Indicators).

12. System Requirement No. 13 dated 14 January 1955; amendment No. 1 dated 10 August 1956.

13. System 438L, Project 4586 and all associated tech and project reports.

Tasks:

45888 - Operational Intelligence Data Processing Equipment
45823 - Weather Data Automatic Reader
45828 - Reconnaissance Systems Integration
45830 - Automatic IBDA Processor
45831 - Automatic Target Analyzer

14. System 438L, Project 4588 and all associated task and project reports.

Tasks:

45889 - Intelligence Data Handling System Design Task
45890 - Machine Fact Correlation for Intelligence Analysis
45893 - Indexing Intelligence Documents for Automatic Machine Retrieval

15. System 438L, Project 4591 and all associated task and project reports.

Tasks

45910 - Basic Minicard Equipment
45911 - Minicard Conversion Equipment
45912 - Lens Components
45913 - Minicard Camera & Enlarger for Aerial Photographs
45914 - Remote Televiewer for Minicard Display
45916 - Viewer Processor MX-1993-G

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16. Project 4597 and all associated task and project reports

Task

45331 - Communication Intercept System Design

17. Project 4594 and all associated task and project reports

Tasks

45940 - Intelligence Classification and Indexing Techniques
45941 - Intelligence Coding Techniques
45820 - Intelligence Data Presentation Techniques
45822 - Intelligence Data Retention and Retrieval Techniques

18. Project 4599 and all associated task and project reports

Task

45861 - Photo Interpretation Mechanization

19. Project 5500 and all associated task and project reports

Tasks

45910 - Radar Target Data Processor
45902 - Infrared Target Characteristics and Utilization
45903 - Infrared Data Analysis

20. System 438L, Project 5532 and all associated task and project reports.

Tasks

45925 - Major Elint Processing Central
45926 - RADINT Data Processing

21. System 438L, Project 5533 and all associated task and project reports.

Tasks

45960 - Rapid Intelligence Data Handling System Design
45961 - Military Tel autograph Development

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(UNCLASSIFIED TITLE) Data Processing Subsystem for ARS WS-117L 2 April 1957
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Tasks (cont.)

45962 - Magnetic Tape Duplicator/Transmitter Development
45963 - Geographic Indexing, Searching and Plotting

h. Coordination and Signature Block

Harold F. Wienberg
HAROLD F. WIENBERG
Major, USAF
Project Engineer

Frederic C. E. Oder
FREDERIC C. E. ODER
Colonel, USAF
Asst. for WS 117L

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DATA PROCESSING SUBSYSTEM FOR ARS, WS117L

General Design Specification

1. General

a. Statement of the Problem

(1) The primary problem involves the establishment and implementation of a realistic program to insure the timely design and development of an efficient Intelligence Data Processing Subsystem. This subsystem must possess the capability of transforming the variety and steadily increasing volume of raw data collected by the WS-117L, as programmed in the combined operational and development schedule, into meaningful intelligence which satisfies user requirements. The fundamental objective and requirement expressed by GOR No. 80(SM-2C) dated 16 March 1955 and SR No. 5 dated 17 October 1955 is to develop the WS-117L to be of maximum value to the U.S. Intelligence Community and key decision making agencies and individuals. The WS-117L will be an addition to the operating USAF Intelligence Collection System. It will have the unique capability of providing a substantially continuous "look" at those areas and things which are of primary and critical importance to the Department of Defense and other key government agencies, such as the Department of State. It is anticipated that the constant high rate, high volume collection capability of the WS-117L will greatly exceed the standard data handling capabilities of the intelligence organization. The planned USAF intelligence organization and structure will therefore require systemitized augmentation with equipment, techniques, procedures, and people to effectively utilize this newly collected product. The timing and development of this subsystem must mate with the ARS development and operation and must be compatible with, support, and receive feedback from the other elements of the intelligence system.

(2) The fact that the WS-117L will provide the capability of obtaining intelligence information of areas heretofore inaccessible to other collection methods makes it mandatory to obtain maximum operational utility of the system during the development phase. Hence, there is a requirement for essentially three versions of the Intelligence Data Processing Subsystem phased timewise to match the developmental growth and capability of the collection system. The problem is to insure sufficient capacity within the Data Processing Subsystem during its development to efficiently utilize the increasing volume of data collected by the various development versions of the satellite vehicle.

b. Approach

(1) The approach as set forth in the subsystem plan is based on an evolutionary concept to:

(a) Secure useable information at the earliest possible time.

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Data Processing Subsystem for ARS, WS117L (cont.)

(b) Encourage a pattern of normal development growth toward improved versions based on the relationship of operational experience and firm knowledge of the product defining needs.

(c) state of the art development, defining possible improvements in information yield (quantity and quality) and efficiency of handling (timeliness and reliability).

(2) It is intended that this subsystem development be phased to match the realistic operational demands and requirements for the WS-117L product, and to be compatible with the volume and type of system collection capabilities for each subsequent version of the reconnaissance vehicle. It will therefore be required to serially:

(a) Engage in studies and work leading to a data handling system design and simultaneously conduct technique research oriented towards the requirements for the initial and interim operating systems.

(b) Initiate the required equipment development programs and perform required engineering to install and test the system while concurrently conducting research on techniques and procedures for applications to the more advanced facilities.

c. Solution

(1) The philosophy underlying the development of the Data Processing Subsystem is based on conclusions arrived at through studies accomplished since 1946 by the United States Air Force and various scientific organizations. These conclusions are summarized as follows:

(a) Intelligence information of vital importance to the nation can be obtained by a Satellite Intelligence System.

(b) A Satellite Intelligence System is technically feasible and is practical for development at this time.

(2) The success of the overall program is dependent upon the following factors which apply specifically to the Data Processing Subsystem:

(a) Continual cooperation and coordination between the United States Air Force and industry throughout the development of the WS-117L Weapon System.

(b) The timely occurrence of decisions throughout the system development to insure scheduling of effort to meet the operational dates established for the WS-117L Weapon System.

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Data Processing Subsystem for ARS, WS117L (cont.)

(c) The integration of personnel, techniques, procedures and equipment through a growth program concept where the system is transformed from the more simple to the complex. The growth will be in the direction of increasing the capacity of the Data Processing Subsystem to handle higher quality and greater quantity of more diverse data, i.e., visual, ferret and infrared, accurately and rapidly.

(3) The WS-117L unique feature which offers a continuous surveillance capability while enjoying high relative physical invulnerability over presently inaccessible areas must be exploited. It should be initially viewed as a revolutionary extension of aerial reconnaissance, with its collected products immediately processed, evaluated and supplemented by pertinent collected data from all appropriated sources.

(4) In order to design a Data Processing Subsystem to support a collection system as unique as the ARS, all of the eventual uses of the data must be known. Each separate use of the ARS data must be studied in order to discover all of the processing steps involved from the receipt of the input ARS information to the production of a finished output which satisfies that use. Once the uses of ARS data are determined, a subsystem design framework can be worked out. Simultaneously research effort can be started to attack technical problems that threaten the successful development of required equipment. With the subsystem design framework completed, equipment developments can be started aided by the results of the foregoing research. Individual equipment testing will precede the installation and final integration to test and operate the subsystem.

The Data Processing Sub-System design has been divided into a series of tasks. The division is based on time phasing rather than function, and as it is planned, the overall systems development will progress from the first to the last. The general tasks areas are as follows:

(a) Intelligence Parameters and Data Handling Criteria Studies

(b) Simulation of ARS Data Input

(c) Subsystem Design.

(d) Equipment Application and Technique Exploration

(e) Equipment Development.

(f) Data Processing System Integration and Test

(g) Personnel Training and Human Engineering Support.

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(5) Simulation of ARS collected product. In order to specify the uses of the ARS data, a simulation program must be carried out. Photographic output at simulated ARS resolution and quantity taken at ARS repetition frequencies must be obtained and analyzed. Ferret and Infrared collection outputs will also be accurately simulated. Working groups consisting of prospective intelligence users and the subsystem designers will collectively determine the usefulness of the data, and outline the requirements for the processing involved. These results will be used in a subystem design phase which will determine the procedures and characteristics of the equipment needed to satisfy the processing requirement.

(a) Photographic cover will be produced of the following types of targets at accurately simulated ARS scale VS resolution, commensurate with the various planned ARS configurations. This requirement will involve high altitude flights with short focal length cameras of known areas, which have both seasonal and non-seasonal changes, and slow change versus anticipated rapid change in construction, movement, etc.

(1) Missile Test Centers

(2) Urban Areas

(3) Airfields

(4) Industrial Areas

(5) AEC Sites

(b) Repetitive photgraphic cover of the above selected target areas will be produced at normal small serial reconnaissance scales, approximately 1/10,000, so that the photo interpretation can be made on a week-to-week basis, unencumbered by exceedingly small scales.* This effort will provide basic photo cover upon which P.I. studies should be made to determine the full effect such repetitive cover has on operating procedures, information extraction techniques and to uncover the data processing problems involved in handling this information.

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*This photo cover should be flown on a schedule 2-3 times/week daytime basis (random time selection) and following a supply build up of new data should be expanded to include repetitive night cover of the same areas for comparison.

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Data Processing Subsystem for ARS, WS117L (cont.)

(c) Laboratory methods will be developed to degrade conventional aerial photgraphs so that they are respresentative of the ARS scales, resolution and contrast. These photographs should be the best representation of ARS photography that can be obtained without making high altitude flight tests. The purpose of developing such degrading methods is to provide simulation data as soon as possible to minimize the delay involved in obtaining ARS type flight test data.

(d) Close work with members of the intelligence community and other agencies noted below will be required to determine the possible users of the simulated photography obtained in (a) and (b). The results of this investigation will provide fundamental data paramount to the efficient design of the Data Processing Subsystem:

(1) ACIC

(2) D/I Hq USAF

(3) Weapon System Offices (Weapon Guidance Input)

(4) 438L

(5) Hq SAC

(6) Hq TAC

Estimates will be made of the quality of ground received data required to satisfy requirements of the users (with the aid of further simulation) to provide meaningful goals and objectives to the collection subsystem developments as well as providing criteria concerning volume, flow pattern, analysis techniques, dissemination nets, etc., for the data handling subsystem designs. Simulation of the data input produces by the ferret and infrared configurations of the ARS must also be made. For any given ferret sensor and ground environment, the quantity and form of the data will be calculated and simulated. In conjunction with appropriate intelligence organizations this simulated ferret data will be examined to determine its possible utility. Electronic intelligence and communications intelligence data, quality and volume estimates needed to satisfy user requirements will be made to provide guidance to sensor developments and criteria for design of the improved Data Processing Subsystem.

(6) Subsystem Design. The Data Processing Subsystem will be designed to provide for the efficient handling of the data collected by the various configurations of the ARS vehicles. The data obtained from the simulation program will be a basic input to this subsystem design and will provide the means of realistically determining user needs. Equipment developments will be undertaken for all of the components of the subsystem

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as specified by this design. The subsystem design phase will be a continuous effort, and using simulated data of improved versions of the ARS, future requirements and growth of the Data Processing Subsystem will be studies. In this way, the early subsystem can be designed with general awareness of future system requirements, and hence, should provide a framework for improvements. The problem of centralized vs decentralized data processing cost, the technological and operational implications of ground to ground transmission of data between ground intercept stations as a function of realistic delay time, as well as user requirements must be examined and incorporated in the initial subsystem design studies. A continual investigation of existing, anticipated, and new ARS requirements, together with ARDC technical developments and applicable commercial developments will be programmed during the major portion of the cycle.

(7) The Equipment Application and Technique Experimentation Task, and the Equipment Development Task will be accomplished as outlined in the project plan. There are no specific items noted at this time since it is intended to base hardware developments on a firm knowledge of the potential input to the photo interpretation group (and hence utility) and on a well designed system basis.

(8) Data Processing Subsystem Integration and Test. This work will be done in two phases:

(a) research investigation leading to the preparation of detail design specifications for fabrication purposes for the installation and equipping of the ARSIC for purposes of research and development test of the subsystem under simulated and operational use;

(b) complete installation of subsystem equipment necessary to efficiently handle the pioneer-type visual reconnaissance data is desired by 1 March 1960.

During the intervening 6 months period, between that date and the 1st high latitude scheduled launch, CPX-type operations using products of the simulation program for input data will be accomplished to check out and modify the individual component and overall system procedures and performance. This installation will consist of equipment conforming to the best commercial engineering practices and where practicable equipment conforming to applicable JAN specifications.

(a) This work will include but not be limited to:

1. Procurement specifications data for all equipment items necessary for operation of the ARSIC (excluding items in the AF inventory).

2. Equipment quantity and organizational location lists for implementation of the ARS data handling subsystem.

Data Processing Subsystem for ARS WS117L (cont.)

3. Qualitative personnel requirements information for operation of the ARS data handling subsystem.

4. Facility requirement estimates and plans necessary for implementations of the ARS data handling subsystem on a research and development operational test basis. These will include, but not be limited to, the following (this excludes facility cost, but includes equipment lay out restrictions):

(a) Space

(b) Accessory equipment

(c) Air conditioning equipment

(d) Power

(e) Communications channel

(f) Security (physical and communication requirements)

5. Nomenclature description data for each component equipment and major equipment group of the subsystem. These descriptions will contain a functional description of the item and will be submitted as soon as the essential mechanical and electrical characteristics for descriptive purposes are determined.

6. Proposed operational procedures for effective operation of the subsystem and integration of its output with the elements of the 438L System. These will include definitive data flow charts, file-up grading procedures, and special computer programs, in such detail that personnel trained in operation of the equipment per se and capable of performing existing photo interpretation processes could implement the subsystem on a trial basis. Operational procedures evolved while optimizing the efficiency of this subsystem will correspond to existing organizations and procedures insofar as possible.

7. Estimates (cost and manpower) for contractual technical services for the subsystem (facilities provided) in order to operate it on a one year research and development operational test basis. This will include services for error and reliability check outs.

8. Estimates of consumable material required for operation of the subsystem on a one year research and development operational test basis (tape, ribbons, films, processing materials, etc.).

9. Completion of a detailed ARS data processing testing program to be accomplished in the 6 month CPX test phase, which program is designed to check out system performance, reliability, saturation points, saturation behavior, etc.

Data Processing Subsystem for ARS WS117L (cont.)

d. Time Sequence of Development:

(1) As previously stated, the Data Processing Subsystem must provide for the orderly transformation of the raw data collected by the reconnaissance satellites into meaningful intelligence. The requirement for rapid processing of intelligence information is acute, and the problems of speed are of higher priority than ever before. Storage and recall components which encompass large storage capacity in small space must provide intelligence information in a very short search time basis for all users.

(2) The development of the subsystem will be from the simple requirements of handling the gross pioneer product to the more complex requirements of handling the larger detailed visual product as well as products of the ferret and infrared collection media. The general scheduling of the systems and their brief description follows:

(a) Initial Subsystem - October 1960 - The basic subsystem configuration must be chosen to achieve the minimum modification to existing Air Force data handling systems now in R&D. This subsystem must be of unitized design, so that later developments in component processing equipment (based on the improved collection techniques by later versions of the satellite) may be incorporated without altering the "basic" subsystem concept. This in fact may be composed of many persons with easily developed assists to the information extraction process rather than automatic equipment. This system must have the capability of meeting the moderate functional requirements necessary to support the initial reconnaissance capabilities during this period and be compatible with other elements of the Operating Intelligence Data Handling System.

(b) Interim Subsystem - October 1961 - The subsystem configuration must be firmed up during FY-60. Packaging of components, including necessary modifications to commerical and/or military components developed under the initial subsystem must be completed during the latter part of FY60, and complete subsystem tests must be accomplished in time to insure a data reduction facility capable of handling the advanced photographic and ferret versions of the satellite. Again, the processed output must be compatible with the Operating Intelligence Data Handling System. The volume of ARS collected data will be approximately three (3) times that of the initial system.

(c) Final Subsystem - July 1963 - This subsystem will consist of operational versions of data processing equipment, techniques and procedures not now recognized, but resulting from the logical development of the previous two subsystems. Much of the final equipment will come about as a result of solutions to subsystem operational problems encountered in the initial and interim subsystems. The primary output of the system will be all source evaluated ARS semi-finished and/or finished intelligence which will be

Data Processing Subsystem for ARS WS117L (cont.)

fed into the Operating Intelligence Data Handling System existing in this period and disseminated to other special elements of the intelligence system. The volume of ARS collected data will be approximately three (3) times that of the interim system and ten (10) times that of the initial system.

(3) The technical responsibility for the task areas listed below must be combined into one contract in order to most efficiently accomplish the objective of this subsystem:

(a) Subsystem Design

(b) Equipment Application & Technique Exploration

(c) Equipment Development

(d) Data Processing Subsystem Integration and Test.

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2. REPORTS CONTROL SYMBOL

3. DATE
2 April 1957

TITLE
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DATA PROCESSING SUBSYSTEM FOR ARS, WS 117L

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SCHEDULE — CALENDAR YEARS

TITLE	PROJECT OR TASK NR	1957						1958												1959								1960				1961				1962				1963 TO COMPL.			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Data Processing Subsystem	P-1763												A																														
Tasks -																																D						O	O	O		P	E
Intelligence Parameters &	39855																																				D				J
Data Processing Criteria Studies																																									K
Simulation of ARS Data Input	39856																																		Q							
Intelligence Data Processing																																									
System Design	39857																																								
Initial System																				Q																							
Interim System																											Q																
Surveillance System																																			Q							
Equipment Application &																																									
Technique Exploration	39858																																								
Initial System																											Q																
Surveillance System																																			Q							
Equipment Development	39859																																								
Initial System																B									C	D	O			P				E								
Interim System																						B							C	D	O			P							E	
Surveillance System																															B						C	D	O		P	E
																																									J

Contract will be Awarded Task No. 39855 by 21 May 1957

Contract will be awarded Task No. 39856, 39857, 39858, 39859, 39860, by 30 June 1957

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R & D SCHEDULE

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2. REPORTS CONTROL SYMBOL

TITLE
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DATA PROCESSING SUBSYSTEM FOR ARS, WS-117L (cont'd)

3. DATE 2 April 1957

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6. NUMBER 1763

SCHEDULE

CALENDAR YEARS

TITLE	PROJECT OR TASK NR	19 57						19 58												19 59								19 60				1961				1962				TO COMPL.			
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Tasks (cont'd)																																											
ngineering for Data Processing																																											
ubsystem Implementation																																											
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Initial System																B											C	O			P				E								
Interim System																							B								C	O			P							E	
Surveillance System																																B						C	O		P	E
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ersonnel Training and																																											
uman Engineering Support	39861																																										
Initial System											A									Q																							
Interim System											A																		Q														
Surveillance System											A																											Q					

Contract will be Awarded Task Nos. 39856, 39857, 39858, 39859, 39860, by 30 June 1957.

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KEY

A. Contract Awarded

B. Fabrication of development model started (Prototype flight article)

C. Development model fabrication completed (Prototype flight article)

D. End of contractor compliance testing of development model (Acceptance test)

O. Ground Test starts

P. Integration with first flight (Completion of ground test)

E. Completion of functional testing of development model to demonstrate capability (After flight test approval)

J. Preparation of procurement data (End)

K. Production engineering (End)

Q. Design studies completed

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R & D MATERIEL ANNEX

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1763

	SUPPLY	MAINTENANCE	TRANSPORTATION	COMMUNICATIONS	TOTAL
Cost Estimates: Gross:	1,500,000				
Net:	1,500,000				

SUPPLY & EQUIPMENT

Nomenclature Including S/N	Estimated Unit Cost	Total Requirements				Time Phased Net $ Requirements			
		Grs Qty	Gross Cost	Net Qty	Net Cost	FY 56	FY 57	FY 58	FY 59
Minicard System, AN/GSQ-11 Complete	1,500,000	1	1,500,000	1	1,500,000				1,500,000

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R & D MANPOWER ANNEX

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TITLE
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CODE	ORGANIZATION TITLE	TYPE ORG	10. ACTUAL MAN-QTRS LAST QTR	11. PROJECTED DIRECT MAN-YEARS FY 19 58 AVAL	FY 19 58 RQRD	FY 19 59 AVAL	FY 19 59 RQRD	FY 1960 RQRD	FY 1961 RQRD	TO COMPL RQRD
DTE	WS117L Project Office WDD	R	1	1	1	1	1	2	2	*
CWIO	Intelligence Lab, RADC	R	5	4	4	4.8	7.5	12.5	14.0	*
DSH	Human Factors Lab, RADC	R	0	0	0	1.0	2.0	2.0	2.0	*
	TOTAL:		6	5	5	6.8	10.5	16.5	18.0	*
	Total Manpower Dollars:		10,320	36,400	36,400	49,500	74,400	120,100	131,000	655,000

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R & D CONTRACT FUNDS ANNEX

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CHANGE

6. NUMBER
1763

7. ITEM	8. PROJ OR TASK NR	9. END ITEM CAT	10. CONTRACT NUMBER	11. BPSN	12. PREV YRS		13. FY 57		14. FY58		15. FY 59		16. FY60		17. TO COMPL	
					600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER	600	OTHER
Data Processing Subsystem	1763	E		2-117	513M		969M		2000M		6000M		6000M		27000M	
				P-200 Funds:				380M		3500M		4230M		5000M		13000M
TOTAL					513		969	380	2000	3500	6200	4230	6000	5000	27000	130

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[illegible] -8

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R & D COST ESTIMATE RECAPITULATION

☐ SYSTEM ☒ PROJECT ☐ TASK ☐ OTHER

2. REPORTS CONTROL SYMBOL

PAGE OF PAGES

3. DATE 2 April 1957

4. UNCLASSIFIED TITLE Data Processing Subsystem for ARS, WS 117L

5. INITIAL ☒ CHANGE

6. NUMBER 1763

ITEM		A. PREVIOUS YEARS		B. FISCAL YEAR 57		C. FISCAL YEAR 58		D. FISCAL YEAR 59		E. TO COMPLETE	
		[illegible]	OTHER	[illegible]	OTHER	[illegible]	OTHER	[illegible]	OTHER	[illegible]	OTHER
7. CONTRACT	A. TOTAL	513M		969M	880M	2000M	3500M	6200M	4230M	19000M	32000M
	B. AVAILABLE			969M							
	C. NEW REQ				880M	2000M	3500M	6200M	4230M	19000M	32000M
8. MATERIEL	A. TOTAL								1500M		
	B. AVAILABLE										
	C. NEW REQ								1500M		
9. FACILITIES											
10. MANPOWER		10.3M		36.4M		74.4M		120.1M		768.0M	
11. TRAINING			N/A								
12. TEST ITEMS			N/A								
13. TEST SUPPORT AIRCRAFT			N/A								
14. SUBTOTAL		513M		969M	880M	2000M	3500M	6200M	5730M	19000M	32000M
15. TOTAL		523.3M		1885.4M		5574.4M		12050.1M		51786.0M	

ARDC FORM 1 JUL 56 116 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

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[redacted]

26

~~CONFIDENTIAL~~

APR 26 1957

WDTR

SUBJECT: Coordination of WS-117L and WS-438L Intelligence Data Handling Functions

TO: Major General H. M. Estes, Jr.
Asst. Deputy Commander/Weapon System
Detachment #1, Hq. ARDC
Wright-Patterson Air Force Base, Ohio

1. An area of considerable potential overlap in the intelligence data handling field could exist in the implementation of ARDC System Requirement No. 5 which establishes the WS-117L "Advanced Reconnaissance System" and ARDC System Requirement No. 13 which establishes System 438-L, "USAF Intelligence Data Handling System". Pursuance of both of these System Requirements as presently constituted without complete and continual mutual coordination, awareness and understanding of the work progress and technical decisions made could easily waste technical manpower and industrial resources already in short supply.

2. The respective system management and technical supervisory groups should therefore become completely familiar with both programs. Continued effort should be made to effect timely liaison and insure that the results obtained in these programs are mutually compatible. It would seem that this is the minimum action required under the circumstances to insure the achievement of ultimate Air Force goals. The 2 April 1957 WS-117L System Development Plan and Projects Nos. 1759 through 1763 inclusive, are therefore submitted for your detailed review. These documents should provide a clear understanding of the WS-117L Program scope, timing and requirements, and the similarity of the data handling portion described in Project No. 1763 with System 438L responsibilities.

3. To initiate and extend this program coordination effort it is requested that your headquarters prepare and submit to Western Development Division detailed comments and recommendations concerning:

MEMO IS INCOMPLETE

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

[redacted]

~~CONFIDENTIAL~~ 59/65

AF-WP-L-39 MAY 53 3M

SECURITY CLASSIFICATION

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RDB PROJECT CARD

TYPE OF REPORT New Project

REPORTS CONTROL SYMBOL DD-RDB(A)46

1. PROJECT TITLE
~~(SECRET TITLE)~~ ELECTRONIC RECONNAISSANCE SUBSYSTEM FOR ARS, WS117L.

(UNCLASSIFIED TITLE) SUBSYSTEM F, WS117L

2. SECURITY ~~SECRET~~

3. PROJECT NUMBER 1760 24

4. INDEX NUMBER 2-117

5. REPORT DATE 2 April 1957

6. BASIC FIELD OR SUBJECT Stategic Air Warfare System 117L

7. SUBFIELD OR SUBJECT SUBGROUP 46-Electronic Countermeasures

7A. TECH. OBJ. SA-9A, 9B 10, IO-9

8. COGNIZANT AGENCY Air Research & Development Command

9. DIRECTING AGENCY HQ ARDC, WDD

OFFICE SYMBOL WDTR

TELEPHONE NO. Ext 1343

10. REQUESTING AGENCY HQ USAF

11. PARTICIPATION, COORDINATION, INTEREST
USAF/AMC-P
SAC-I
ADC-I
ATC-I
ATIC-I
APGC-I
USN/CNO-I
USA/C/S-I
OTHER/CIA-I

12. CONTRACTOR AND/OR LABORATORY Lockheed Aircraft Corp. See 21c.

CONTRACT/W.O. NO. AF04(647)-97

13. RELATED PROJECTS WS 117L

14. DATE APPROVED

15. PRIORITY 1A

16. A(Missiles)

INFORMATI COPY

17. EST. COMPL. DATES
RES. 1961
DEV. 1962
TEST 1965
OP. EVAL.

18. FY	FISCAL ESTS. (M $)
Prev.	374M
57	633M
58	1200M
59	4500M
60	4500M
61-65	13000M
TOTAL	24207M

19.
This is the initial report on this project

20. REQUIREMENT AND/OR JUSTIFICATION

Electronic reconnaissance using ground, shipborne or conventional airborne stations is seriously limited in penetration beyond the borders of the Soviet Bloc. The Advanced Reconnaissance System will provide a satellite vehicle from which electronic intelligence information may be obtained from signal sources located well within the borders of the Soviet Bloc. Although the peculiar environmental conditions and operational circumstances will affect the quantity and quality of the signal data obtained, it is expected that ample intelligence will be derived to justify the effort.

The development of an electronic reconnaissance subsystem is necessary because existing systems are not capable of operating unattended in the environmental conditions which will prevail in the satellite nor are they capable of performing the desired functions for the volume of traffic anticipated.

The intelligence provided by an electronic reconnaissance subsystem from a satellite vehicle is expected to augment the information available from existing sources. Data may also be obtained which will provide guidance in the direction of other intelligence gathering efforts. This subsystem will provide knowledge of Soviet military build-up, preparedness, capability, possible intent and approximate distribution of certain types of weapon and defense systems.

DD-RDB SN

57

DOWNGRADED AT 12 YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

It will also provide indications of Soviet military and technological progress.

21.a. Brief and Military Characteristics

The Electronic Reconnaissance Subsystem will be capable of detecting, measuring and processing electromagnetic signals emanating from areas of interest.

The equipment will gather information describing the signal parameters and location of unknown emitters. Each flight will attempt to accomplish a predetermined intelligence mission. Information received by the ferret subsystem will be stored for subsequent re-transmission to the ground data link. Ground analysis and data reduction will be performed with the received data.

b. Approach

Ferret equipment will be designed to satisfy requirements based upon considerations of the electronic intelligence objectives of the United States that may be satisfied by a satellite reconnaissance system. Design and development of the pioneer equipment can be initiated immediately in order to obtain some intelligence data as soon as possible. Study must proceed simultaneously to establish the intelligence requirements for later missions and to develop the specialized equipment needed. In all cases, the equipment will be designed to satisfy certain specific intelligence-gathering missions.

Initial configurations of the equipment will gather data of primary intelligence importance available to a satellite reconnaissance system. The equipment will be capable of identifying the presence of known signals and unknown signals within each of several frequency bands. Accuracy of information concerning frequency and ground location may be sacrificed to optimize intercept probability.

Later configurations of the equipment will be tailor-made to perform specific intelligence missions. Improved accuracy will be provided for measurements such as ground location and signal parameters.

The physical environment will present several major problems to be overcome. These effects include shock, vibration, cosmic and nuclear radiation, meteorite collision, micrometeorite errosion, and low pressure. Other problems include: (1) obtaining a long-life power source, (2) providing equipment with high reliability in unattended operation, (3) designing antennas which have the desired beamwidth, gain and size characteristics, (4) determining the optimum settings for signal thresholds, bandwidths, etc., and (5) meeting payload restrictions.

c. Subsystem Tasks

(1) (a) Task 39822. Pioneer Ferret Reconnaissance Equipment.

(b) Contractor. Lockheed Aircraft Corporation
Sub-Contractor: Not Determined
Task Advisor: Lt W. Kram, WCLR, WADC

(c) Objective. The Pioneer configuration will gather basic intelligence data about two types of signals:

1. Known signals - Signals whose basic parameters match certain known patterns.

2. New signals - Signals whose basic parameters deviate significantly from known patterns.

(d) Approach. Knowledge of the characteristics of various Soviet signals will be used to design a portion of the equipment for maximum probability of intercepting known signals. Sufficient accuracy must be maintained in measuring the basic signal parameters to permit sorting of known signals from unknown signals. Equipment will meet the requirement of determining the approximate geographical locations of known signal types and determining the existence of new signals in certain bands where emitters are suspected.

Other portions of the equipment will use broadband antennas and receivers to permit the monitoring of selected bands where activity is presently unknown. Only the presence of signal activity within each of several broad bands, and perhaps a rough measure of certain parameters will be indicated. Accuracy of information concerning frequency and ground location will be sacrificed to optimize intercept probability.

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[redacted]

The preliminary analysis of the signal which is to be accomplished aboard the satellite will require circuitry which is well within the state-of-the-art. Each frequency band of interest will be allotted a recorder channel. Time also will be recorded in synchronism with the signal information. Recorded data will be such as to permit a 10 Kc bandwidth for each recorder channel. Measurements will be made of the following parameters:

1. Radio frequency
2. Ground location

[redacted]

Playback and transmission of the data to the ground will be accomplished by a telemeter link. The telemetry output on the ground will be stored on magnetic tape for subsequent analysis and reduction.

Ferret subsystem functional control will be provided by an interval-indicating programmer which will be re-set by command from the ground after each transmission period.

(f) Test and evaluation. Of prime importance to the success of the project is the specification and implementation of rigorous environmental and operational testing for all components and assemblies. All portions of the system will be evaluated both individually and as an integral part of the complete system.

(2) (a) Task 39823. Advanced Ferret Reconnaissance Equipment

(b) Contractor. Lockheed Aircraft Corporation
Sub-contractor: Not yet determined
Task Advisor: Lt. W. Kram, WCLR, WADC

(c) Objective. The Advanced configuration will be designed to overcome some of the limitations of the Pioneer equipment. The Advance Configuration will be capable of determining with greater accuracies such details as ground location and signal parameters.

(d) Approach. Parameters and accuracies will be established by correlating state-of-the-art techniques with the current intelligence knowledge and desires. Based on the results of the Pioneer evaluation, reconnaissance will be extended to additional portions of the frequency spectrum and to geographic areas of interest.

(e) Characteristics. The Advanced configuration will be composed of two types of receiving equipment. The first type will accomplish the purpose of obtaining more accurately the radio frequency and other electrical properties of the signal. It will consist of a frequency-scanning receiver capable of permitting PRF analysis to within a few per cent. The second type will accomplish improved locational accuracy. It will consist of fixed, tuned receivers of limited bandwidth capable of utilizing more sophisticated direction-finding techniques. Both types of receiver equipment will require research and development programs which should be started during 1957.

Data analysis for the Advanced equipment will be similar to the Pioneer except that more pulse width categories shall be considered. Amplitude quantizing will be required to permit scan patterns to be analyzed and to permit null detection direction-finding systems to be employed.

Telemetering, programming, and ground analysis shall be similar to that employed in the Pioneer configuration.

(3) (a) Task 39824. Surveillance Ferret Reconnaissance Equipment

(b) Contractor. Lockheed Aircraft Corporation
Sub-contractor: Not yet determined.
Task Advisor: Lt W. Kram, WCLR, WADC

(c) Objective. To provide answers to specific intelligence requirements in the radio frequencies of known or suspected enemy activity by means of the satellite ferret reconnaissance vehicle. Surveillance equipment will be tailor-made to provide a capability of performing specific intelligence missions.

(d) Approach. On the basis of previous satellite reconnaissance data and national intelligence objectives, continuing refinement and sophistication of equipment and techniques will be performed. Frequency coverage and measurement accuracies will be extended as required.

(e) Characteristics. The Surveillance equipment will utilize previously developed ferret equipment and techniques where applicable to the [redacted] in long distance scatter propogation links. Parameters and accuracies of measurement will be determined by intelligence requirements and the current state-of-the-art in electronic techniques.

Telemetering, programming, and ground analysis should follow the lines of action of the previous ferret systems where applicable. Continuing analysis of the equipment capabilities and the intelligence objectives is essential to insure that specific missions can be attained, and that critical development areas are delineated.

~~SECRET TITLE~~: ELECTRONIC RECONNAISSANCE SUBSYSTEM FOR ARS, WS117L — 2 April 195
(UNCLASSIFIED TITLE) SUBSYSTEM F, WS117L — Proj 1760

d. Other Information

Work of a similar nature is currently being carried on for ground-based and airborne reconnaissance systems. However, the restrictions on size, weight, reliability, and operating environment are unique to this system and preclude usage of equipment not specifically designed for a ferret satellite. Because of specialized capability required it is planned that the majority of this subsystem will be developed by a suitable subcontractor to Lockheed Aircraft Corporation.

e. Background History

Studies have been made as long ago as 1947 by Project RAND of the Douglas Aircraft Co. to determine the problems and feasibility of launching an earth satellite and the tactical considerations relevant to an earth satellite. Recent studies of the feasibility of a satellite reconnaissance system were completed by Lockheed Aircraft Corp., G. L. Martin Co., and Radio Corporation of America.

f. Future Plans See Text

g. References

Quarterly and Final Reports on Contracts:

AF33(600)3104
AF33(616)3105
AF33(616)3106

Project RAND, Douglas Aircraft Co. reports RA-15021 through RA-15028 and RA-15032.

h. Signature and Coordination Block:

William O. Troetschel
WILLIAM O. TROETSCHEL
Captain, USAF
Project Engineer

Frederic C. E. Oder
FREDERIC C. E. ODER
Colonel, USAF
Asst. for WS117L

[redacted] ~~CONFIDENTIAL~~

a. Present status of System 438-L; i.e., planned technical description of the program, funding, scheduling, priority, management procedures and planned method of implementation, degree of supervisory and management responsibilities delegated to ARDC Centers etc.

b. Delineation of those specific portions of the WS-117L work outlined in Project 1763 which can be accomplished under the design and development of System 438L, including in particular the technical extent of each portion described, accompanied by specific scheduling and programming committments.

4. It is requested that these recommendations be forwarded to Western Development Division as soon as possible, since action has been suspended on the implementation of Project 1763, pending their receipt.

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

Incls:

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

Col Terhune's R+W file

Prior to 1 May 57

Approval of a Feasibility Study

[illegible] [illegible] x 2
Mr. [illegible] Lt Col Engbert/vh/[illegible]

1. It is requested that [illegible] be authorized to accomplish the Feasibility Study outlined in the attached Statement of Work. This Feasibility Study is to be conducted under Paragraphs [illegible] and [illegible] of the Contract Statement of Work.

2. This study is to be accomplished within 60 days and is to result in a final report. Interim progress reports will not be required.

3. The work is to be accomplished within the manpower and dollar limitations provided on the current contract.

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Donald W. Norton
Col USAF
for C. H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Technical Operations

1 Incl
Statement of Work (Draft)
(CONF) - 3 pp - 1 copy

cc: Maj Rowland
cc: Col [illegible]

SEE PARTIAL REPORT UNDER DATE 3 June 1957

DOWNGRADED AT 3 YEAR INTERVALS.
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

When inclosures are withdrawn the classification of this correspondence will be downgraded to Uncl in accordance with AFR 205-1.

~~CONFIDENTIAL~~

D R A F T [redacted]

Statement of Work: Scientific uses of WS 107A-1 and WS 107A-2

Item I - The Ramo Wooldridge Corporation, Guided Missile Research Division shall conduct a program of studies to perform an initial evaluation of the feasibility of a scientific data collection program useful to the ICBM and follow-on projects. The study will be based on the substitution of alternate nose cones for warhead nose cones on the presently scheduled launchings of TITAN and ATLAS missiles in both the R&D and operational programs.

The study program will include, in progressive steps, determination of the scientific information which is needed, and which is obtainable through:

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(1) The use of instrumented nose cones which follow the ICBM trajectory and make telemetered space measurements.

(2) The use of instrumented nose cones which follow the ICBM trajectory and take space measurements which are recorded and retrieved through a recovery package or complete recoverable nose cone.

(3) The substitution of a powered nose cone to provide orbiting capability. In this phase maximum use will be made of those components of the WS 117L vehicle which are suitable to providing a platform for collecting scientific and geophysical data. The components of WS 117L of particular usefulness are the Airframe, Propulsion, Guidance and Control and Auxiliary Power Subsystems. Some phases of the Ground-Space Communications subsystem will also be of considerable use.

DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

(4) The provision of sufficient additional velocity increment to provide an early and minimum lunar flight capability. The study shall consider the optimum use of all items and installations necessary to carry out a complete scientific program. This includes, as to equipment, the bases, the launching crews, the communications equipment, and the actual boost vehicles. The present ICBM program provides for a continuous series of launchings for the attainment of reliability, the proving out of product improvements, the training crews and the maintenance of an assured ready capability. It is to be assumed for the purpose of this study that the warhead nose cone for some of these launchings will be replaced with an exact duplicate as the external appearance, weight, and structural capability, but which internally is a highly instrumented measurement device to satisfy steps 1 and 2. For step 3, the nose cone will be replaced with an instrumented WS 117L airframe to provide an orbital capability. Emphasis shall be placed on the accomplishment of a program for the collection of scientific information with a minimum of additional cost. The results of all obtainable previous studies which are pertinent shall be considered and incorporated in the final report.

Item II - The work described in Item I shall result in:

(1) A statement of data requirements.

(2) Preliminary criteria for the equipments necessary to conduct the four step program.

(3) Proposed experiments which illustrate the way the continued program from steps 1 through 4 could be used for scientific and geophysical experiments of use to the ICBM, follow-on satellite [illegible] military scientific purposes [illegible] benefit

(4) Scheduling and programming data based on the present ICBM programs, outlining the time period in which each of the steps could be accomplished.

(5) Cost data for each of the steps based on the schedules arrived at in (4) above.

Item III - A final report shall be submitted. The report shall show the results of the study, the scheduling and costing for each step 1 through 4 outlined in Item I above. The study shall be completed within 60 days after the receipt of this work statement. It is estimated that the over-all scope of the work should require approximately 20-30 man-months for completion.

[redacted]

R&D 2-1 29

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WDTR

MAY 23 1957

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Preparation of Preliminary Operational Concept for WS 117L

1. Representatives of Hq USAF, Lt. Col. G. Adkins, AFOIN-1E2, Lt. Col. R. Kemp, AFOIN-1A2, and Major R. Brown, AFOOP-OC-R, met with Major Wisenberg, WDTR, 11-14 May concerning the preparation of the Preliminary Operational Concept for WS 117L. This was in general the visitors initial association with the program and they devoted a major portion of the period toward gaining an understanding of the system, i.e. description, status, capabilities, problems and the implications this system may have on USAF intelligence collection operations and data handling procedures.

2. The six (6) major information areas listed below which comprise the content of the POC document as specified in AFR 5-47 were discussed, and rough draft notes previously prepared by WDTR were reviewed:

a. General Description

b. Organization

c. Operational Capabilities

d. Utilization

e. Communications and Electronics

f. Theatre and Time Deployment

3. It was informally requested that WDTR assist the Hq USAF group in preparing the initial POC draft which will later be circulated through the Air Staff for comments. The visiting members plan to jointly write a draft of the "Organizations" section of the POC following discussions with their respective Directorate Chiefs, and requested that WDTR rewrite and expand in part the remaining five (5) sections noted above. It is planned that the group will reconvene during the week of 10 June to review the work and prepare the initial composite POC draft.

4. WDTR recommended that the group preparing the "Orgainzation" section of the POC seriously consider the following two major points:

a. The WS 117L will be a new addition to the USAF Intelligence Collection System and as such will require support facilities

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD [illegible]

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~~CONFIDENTIAL~~

for the initial launching of the satellite and the continuous tracking, command, and readout functions to be performed. It is anticipated that the constant high rate, high volume collection capability of this system when fully operational will greatly exceed the standard data handling capabilities of the intelligence organization. The as planned USAF intelligence organization and structure will therefore require systemitized augmentation with equipment, technique, procedure and people to effectively utilize the data collected. This new organization (group or wing level size) should be assigned directly to or be directly controlled by Directorate of Intelligence, Hq USAF, to insure timely intelligence feed back from other special collection systems for optimum control of system and utilization of the collected data.

b. To attain the earliest possible operational capability the system should be run on a combined operational-development basis during the development phase beginning with the first high latitude shot, continuing until we meet the GOR specifications of a surveillance capability. R&D type equipment will be utilized and new procedures and techniques as required will be derived during this period of continued test and limited operational launchings. It is therefore highly desirable that in addition to the responsibility for conducting the research and development leading to a fully operational WS 117L system, the Commander, Ballistic Missile Division, Hq ARDC be assigned the additional responsibility of establishing an IOC during the development phase of the WS 117L program, similar in nature to the IOC responsibility assigned in the ICBM development program. As fully operational subsystems become available they will replace the R&D equipment previously supplied to the IOC. The command structure of the IOC will conform to the decided upon organization and command structure and procedures. Close coordination will be established between Hq USAF Directorate of Intelligence and BMD to insure that the eventual transfer of these units may be accomplished with no degradation to operational efficiency.

5. WDTR will prepare the draft portions of the POC for the 10 June meeting as requested.

for - Quentin A. Riepe

~~FREDERIC C. E. ODER~~
Colonel, USAF
Director, WS 117L

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[redacted]

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FEASIBILITY OF SCIENTIFIC USES OF IRBM AND ICBM

- - - - - - - - - -

3 June 1957

PART 1. SUMMARY OF THE STUDY

At the request of the Western Development Division, The Ramo-Wooldridge Corporation has conducted a feasibility study of the possibility of obtaining useful scientific measurements during research and development, training, and operational readiness flights of the Atlas, Titan, and Thor* ballistic missiles. This part of the report summarizes the conclusions of that study, and Parts 2, 3, and 4 present pertinent details of the study.

1.1 The Basic Idea and the Policy of Minimum Interference

Starting about two years from now, a number of IRBM's and ICBM's will be flown on training flights and flights to prove out operational readiness (confidence firings). A live warhead will not be carried during most of these flights. It has been proposed that instead of replacing the warhead entirely by a dummy warhead the space and weight made available could be used, at least in part, for instruments for making scientific measurements of the upper atmosphere and throughout the regions of space which can be observed from the missile during its flight.

Since examining the problem more closely, we have come to realize that there are several places besides the nose cone where space for instruments is readily available, and that there are some practical advantages associated with utilizing these spaces, rather than trying to pack the instrumentation into the exact space vacated by the warhead. If the instrumentation package is not placed in the nose cone, and if it is deemed desirable that the nose cone should behave normally during re-entry (so far as deceleration, trajectory, heating, and fusing are concerned), then a dummy warhead will have to be used in the nose cone. If maximum range is desired, then the dummy warhead can be made lighter than the normal warhead to compensate for the weight of the instrumentation. On the other hand, if some range can be sacrificed in the practice flights, the missile take-off weight could be allowed to exceed its design value by the weight of the

GROUP 4
DOWNGRADED AT 3 YEAR
INTERVALS; DECLASSIFIED
AFTER 12 YEARS

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*Although Thor was not mentioned in the work statement, Ramo-Wooldridge has considered it also for the sake of [illegible]

[illegible] report filed
[illegible] Hist Ofc

instrumentation package, thus causing a corresponding decrease in range. This would permit a full-weight dummy warhead to be carried in the nose cone. On Atlas, Titan, and Thor, there are suitable locations for instrument packages weighing up to several hundred pounds. No modifications of the missile are required other than relatively minor structural modifications for attaching a self-contained package which would include instruments, power supply, telemetering, and whatever else is necessary to carry out the experiment without any tie-in to missile power or missile communications.

Throughout the study, Ramo-Wooldridge has operated on the premise that the scientific measurements program should cause minimum interference with the effectiveness of training or with the operational readiness capability. Consequently, the experimental packages have been planned to require a minimum of modifications to the missile as well as a minimum of interference with the countdown procedure.

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It appears that there are two classes of scientific tests as viewed from the standpoint of those who are responsible for training and operational readiness. The first of these is the completely noninterfering test, wherein the addition of the instrument package to the missile must cause no change in the handling procedure. The countdown operation must be completely normal and the trajectory unchanged, and there must be negligible interference with accuracy, re-entry conditions, or measurements in the impact area. It may be assumed that, if these objectives can be fully realized, the Air Force will permit a significant fraction of training and readiness flights to be used for scientific data collection.

The second class of scientific experiments are those which involve "disturbed flights." Here again the object will be to cause minimum modification of the missile and minimum interference with the countdown procedure, but in other ways the flight would be abnormal. For example, the missile might be flown along a lofted trajectory in order to obtain greater altitude. Or the nose cone might be replaced by a powered vehicle capable of bringing a payload of instruments into a satellite orbit or evenon a free-flight trajectory to the moon. Because such "disturbed flights" interfere with tests that are normally made in the impact area, and because they are likely to involve some modification in the handling and countdown proce[illegible] at the launching base, it may be assumed that only a small fraction, say one [illegible] out of ten, could be "disturbed." Whereas the noninterfering flights probably would be flown from the IOC base, Cooke Air Force Base, a few of the "disturbed flights" might be launched from AFMTC, which is better instrumented for telemetry, is the only base with capsule recovery capabilities, and is located more favorably for launching lunar rockets and some satellites.

Again we should like to emphasize the importance attached to noninterference with the countdown procedure during the "noninterfering flights." There should be no need to have personnel interested in the experiments in the vicinity of the launching stand during, say, a five-hour period preceding launching. As mentioned above, the experimental instrumentation package should be completely self-contained, including its own power supply. There should be an acceleration-actuated switch which turns on the power during the boost period, thus eliminating the necessity of turning on the power as a part of the missile countdown. Similar design philosophy would be used throughout, so that there need be no contact with the instrumentation package during the hours immediately preceding launching.

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Table 1-1 gives a summary of possible flights for the years 1959 through June 1961. It was assumed that about half of the flights are instrumented for scientific observations, but that only one out of ten is disturbed; thus the table gives a summary of the scientific measurements program which might be conducted during those years.

Only the IRBM's and ICBM's intended for confidence firings have been discussed so far; there are a certain number of boosters, however, which are intended for research and development flights from AFMTC. Generally speaking, these flights will already be loaded with instrumentation associated with the more immediate problems of getting the ballistic missile to function reliably or trying to understand why it has failed in some particular aspect. It is possible, however, that some missiles may be fired to learn more about a specific design problem which has been a source of trouble, but that the instrumentation associated with these tests is less than that which can be carried. In this event it may be possible to make use of additional flights out of AFMTC for the scientific measurements program.

CONFIDENTIAL [redacted] — 31

JUN 25 1957

MEMORANDUM TO: Colonel Terhune, WDT

SUBJECT: WS 117L Preliminary Operational Concept

1. The attached D/F to Lt/Col. Ahola directing the transmission of the accompanying draft of the WS 117L Preliminary Operational Concept to Major R. Brown, AFOOP-OC-R, Hq. USAF was prepared for your signature to insure your review before going forward.

2. This office has prepared all but Section II of the drafted concept, in accordance with Hq USAF's informal request reported in memorandum of 23 May, Attachment #2. Section II entitled "Organization" was prepared by the Reconnaissance Branch, Operations Control Division, Directorate of Operations, DCS/O, Hq USAF, AFOOP-OC-R, and a copy hand-carried to WDTR by Major R. Brown of that office during a visit on 4 June. Major Brown reported that this draft section was informally coordinated by his office prior to 4 June with B/G Walsh, Deputy Director of Intelligence, AFOIN, and M/G K. P. Berquist, Director of Operations, AFOOP. These officers and their staffs favorably endorsed the eventual assignment of WS 117L to SAC and the immediate assignment of an IOC to ARDC (Par. B, J, K, and L). In addition, representatives of SAC were subsequently informed by Hq USAF of this informal action.

3. Please be advised that we have followed the action recommended in your memorandum of 1 June which expressed concern about the timing and organization level of introducing the IOC aspect. However, the points concerning the nomination of a command organization and ARDC's IOC role were discussed with the Hq USAF representatives during their 14-16 May visit. The "Organization" section was an outgrowth of that one meeting with WDTR although a number of subsequent internal air staff meetings were held between Directorates of DCS/O, during the week of 20 and 27 May.

4. DCS/O plans to use the attached rough draft as a basis for the first official draft of the Preliminary Operational Concept which, when prepared will be circulated through the Air Staff, Hq SAC and AFBMD, Hq ARDC, for formal comments and recommendations before the Preliminary Operational Concept receives formal official sanction.

5. Major R. Brown requested that the attached completed draft be forwarded directly from this Division to him via Lt/Col Ahola to insure controlled and expeditious handling since it should be considered only a working paper.

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DOWNGRADED AT [illegible] YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

Quentin A. Riepe
for FREDERIC C. E. ODER
Colonel, USAF
Director, WS 117L

2 Incls
1. DF to Col Ahola, 2 pp, WDTR 57-207 W/Incl, Ops Concept, 14 pp ea. WDTR 57- [illegible]
3 cys
Memo to Col [illegible]
above [illegible]

57-207

CONFIDENTIAL

FOR OFFICIAL USE ONLY (AFR 190-16)

AIR FORCE BALLISTIC MISSILE DIVISION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

WDTR

5 September 1957

Brigadier General Donald P. Graul
Commander
Rome Air Development Center
Griffiss Air Force Base, New York

Dear General Graul:

General Schriever has requested that in his absence I take this opportunity to welcome you back into the ARDC family. He hopes that you will have a personally gratifying tour of duty at Rome.

In addition to the ICBM and IRBM programs, AFBMD also has responsibility for the WS 117L (Advanced Reconnaissance System) program as you probably know. We consider it to be one of the most challenging and important programs within ARDC today. Based on the mission of your Center and the capabilities of your Intelligence Laboratory, General Schriever has had members of his staff investigate the desirability of delegating to RADC full responsibility to this Division for the intelligence data handling portion of the WS 117L program. Your Center representatives, Mr. Harry Davis, Colonel James Anderson, and Mr. Richard Libby, have very responsively indicated a sincere and energetic desire to accept responsibility for this project and have verbally assured us of their capability to perform in terms of manpower, interest, and center support.

General Schriever shares the feelings of his staff that this delegation of responsibility would be to the best interests of the Air Force and to the over-all WS 117L program. He would, therefore, appreciate the opportunity of personally discussing this subject with you and members of your staff at the earliest possible date convenient for you to visit this Division.

I would suggest that we tentatively set a date during the week of 23 September since General Schriever's schedule is completely filled prior to that time. If you would have someone on your staff call me the week of 16 September, we could confirm a date. My phone number is ORchard 2-0192, extension 607.

Sincerely,

SIGNED

J. L. HAMILTON
Colonel, USAF
Executive [illegible]

WDTR [illegible] B. Clasby
[illegible]

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WDGE

16 September 1957

MEMORANDUM FOR WDT

SUBJECT: Visit by Brigadier General Donald P. Graul, Commander, Rome Air Development Center

1. Brigadier General Donald P. Graul, Commander, Rome Air Development Center, will be visiting the AFBMD 23 September 1957. Reference is made to the letter to General Graul initiated by WDTR dated 5 September 1957 in which an invitation was extended to visit the AFBMD for a briefing on the 117L.

2. Although this office will handle all other arrangements pertaining to General Graul's visit, it is requested that you prepare an agenda and monitor the actual briefing. For planning purposes, General Graul will be available all day the 23rd if necessary, however, you should not plan on starting the briefing until 0930 due to his appointment with General Schriever at 0900. Request you submit to this office by 19 September the planned agenda with times and speakers indicated.

(S)

J. L. HAMILTON
Colonel, USAF
Executive Officer

WDGEP G-RH
Lt Flippo 675

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15 Oct 57

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PRIORITY

X AF

COMMANDER, AFBMD, INGLEWOOD, CALIFORNIA

COMMANDER, ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE, NEW YORK

UNCLASSIFIED FROM WDTR 10-15 FOR GENERAL GRAUL

AS A FOLLOW-UP TO RECENT DISCUSSIONS CONCERNING ASSIGNMENT OF RESPONSIBILITY TO RADC FOR DEVELOPMENT OF SUBSYSTEM I OF WS 117L, THE FOLLOWING GUIDANCE IS PROVIDED TO ASSIST IN ESTABLISHING PROCEDURES TO SELECT PRIME CONTRACTOR, SUBSYSTEM I, WS 117L. THIS SELECTION IS OF IMMEDIATE AND MUTUAL CONCERN TO BOTH RADC AND AFBMD, AND IT IS THEREFORE RECOMMENDED THAT THE SOURCE SELECTION BOARD NOTED BELOW BE DULY APPOINTED AND CONVENED AT RADC ON OR ABOUT 6 NOVEMBER TO INSURE TIMELY WORK INITIATION IN THIS IMPORTANT AREA:

1. A SPECIAL SOURCE SELECTION BOARD BE APPOINTED BY COMMANDER RADC FOR THE PURPOSE OF APPROVING SOURCES AND IMPARTIALLY REVIEWING PROPOSALS RELATING TO THE RESEARCH AND DEVELOPMENT OF SUBSYSTEM I, WS 117L, AND IF ANY OF THE PROPOSALS ARE FOUND TO BE ACCEPTABLE, RECOMMEND TO COMMANDER RADC THAT A FIRM PRIME SYSTEMS CONTRACT FOR

OCT 1957

WDTR

(4)

MAJOR HAROLD F. WIENBERG
1171-72

J. L. HAMILTON
Colonel, USAF
Executive Officer

UNCLASSIFIED

BSYSTEM I, WS 117L BE NEGOTIATED WITH THE BEST QUALIFIED SOURCE. BMD AND BMO-HQ AMC NOMINATIONS FOR THE BOARD ARE: COLONEL FREDERIC E. ODER, 7684A, AFBMD, CLEARED TS, LT COLONEL JAMES SEAY, 12319A, O-HQ AMC, CLEARED TS, MAJOR HAROLD F. WIENBERG, 15220A, AFBMD, TECHNICAL REPRESENTATIVE, CLEARED TS. BASED UPON DISCUSSIONS COMMANDER RADC AND THIS DIVISION 23 SEPTEMBER APPROPRIATE RADC REPRESENTATIVES INCLUDE: COLONEL BURHANNA (PRESIDENT), MR. HARRY DAVIS, MR. RICHARD LIBBY (TECHNICAL REPRESENTATIVE).

2. THE URGENT NEED TO INITIATE PRIME SYSTEM CONTRACTUAL WORK IN SUBSYSTEM I AND THE NECESSITY TO MAINTAIN SECURITY INTEGRITY OF THIS SENSITIVE PROGRAM REQUIRE THAT A MINIMUM NUMBER OF POSSIBLE SOURCES COMPATIBLE WITH CONDUCTING A FAIR AND IMPARTIAL COMPETITION SHOULD BE CONSIDERED. THE BMD AND RADC TECHNICAL REPRESENTATIVES SHOULD JOINTLY COMPILE THE LIST OF SOURCES BASED UPON APPLICABLE CRITERIA ORIGINALLY ESTABLISHED FOR THE OVER-ALL COMPETITIVE SELECTION OF THE WS 117L PRIME CONTRACTOR SUPPLEMENTED BY SUCH TECHNICAL CRITERIA AS MAY BE DETERMINED AS BEING PARTICULARLY APPLICABLE TO SUBSYSTEM I. THE SOURCE LIST SHOULD BE REVIEWED AND APPROVED BY THE BOARD PRIOR TO SOLICITATION OF PROPOSAL BY RADC.

3. MEMBERS OF THE BOARD SHOULD BE REQUESTED TO ATTEND ALL PRE-PROPOSAL BRIEFINGS HELD.

4. RADC SHOULD ACCOMPLISH THE DETAILED WORK STATEMENT PREPARATION, TECHNICAL AND COST NEGOTIATION AND CONTRACT EXECUTION WITH THE BEST QUALIFIED SOURCE AS RECOMMENDED BY THE BOARD.

MANDER, AFBMD, INGLEWOOD, CALIFORNIA

ORMAL DISCUSSION CONCERNING THESE PROCEDURES AND TENTATIVE
ROVAL OF THE 6 NOVEMBER DATE HAS OCCURRED AT THE PROJECT LEVEL
EEN MR. RICHARD LIBBY, RADC, AND MAJOR HAROLD WIENBERG, AFBMD.

VDRR

RECEIVED
WDD ARDC
ACTION WDTR
11 JAN 1958 01 26
INFO: ______

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TO COMDR AF BALLISTIC MISSILES DIV ARDC
BT

UNCLAS FROM RCK-1-47E FOR COLONEL ODER
COMDR RADC HAS BEEN BRIEFED THIS DATE REFERENCE FINDINGS OF SUB SYSTEM I SOURCE SELECTION BOARD GEN GRAUL HAS CONCURRED IN BOARDS RECOMMENDATION AND DESIRES IMMEDIATE INITIATION OF PROCUREMENT ACTION IT IS REQUESTED THAT BMB NOT CONTACT THE SELECTED CONTRACTOR UNTIL THIS HQ ADVISES THAT CONTRACTING OFFICER HAS INITIATED NEGOTIATIONS WITH THE CONTRACTOR SIGNED H BURHANNA COL USAF
BT
10/2131Z JAN RJEPGF

116

Headquarters
ROME AIR DEVELOPMENT CENTER
Air Research and Development Command
UNITED STATES AIR FORCE
Griffiss Air Force Base, New York

Office of
THE COMMANDER

11 January 1958

SUBJECT: Source Selection, WS-117L, Subsystem I

TO: Director of Procurement
Rome Air Development Center
Griffiss Air Force Base, New York

1. This is to confirm my verbal orders of 10 January 1958.

2. The selection of the Ramo-Wooldridge Corporation as the source for WS-117L, Subsystem I, in accordance with the findings of the BMD/RADC Source Selection Board, is approved. You are directed to initiate immediate procurement action and enter into negotiations with this contractor.

SIGNED
D. P. GRAUL
Brigadier General, USAF
Commander

CONFIDENTIAL

[redacted]

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WDTR

JAN 15 1958

MEMORANDUM TO GENERAL SCHRIEVER

SUBJECT: Selection of Prime Contractor for Data Processing Subsystem, WS 117L

1. In compliance with Special Orders No. 119, Hq Rome Air Development Center, dated 1 November 1957, Inclosure #1, the Source Selection Board met at RADC during the periods 6-8 November 1957 and 7-10 January 1958.

2. During the 6-8 November 1957 meeting period the Board established detailed source evaluation procedure, including:

a. General criteria for selection of competent solicitation sources.

b. Appointment of a working group composed of technically competent members.

c. Instructions to the working group.

d. Detailed evaluation criteria for selection of contractors.

e. Time phasing of the Site Selection Board actions.

f. Scope of general management proposal to be submitted.

In accordance with instructions received from the Board, the working group screened a total of 138 prospective contractors and submitted to the Board the following numerically ranked four (4) contractors considered tentatively qualified to be solicited with request for proposal:

(1) Ramo-Wooldridge Corporation

(2) Radio Corporation of America

(3) International Business Machines

(4) Eastman Kodak

The total list of prospective contractors from which the above four were selected was composed of [illegible] contractors on the ASTIA Field of Interest Register (FOIR) under the general category of Intelligence Data Handling, in addition to approximately ten contractors not so registered who the working group judged eligible for consideration.

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[redacted]

3. The recommended four (4) sources were so solicited by RADC on 13 November and an inquiry meeting held on 20 November at RADC. The Request for Proposal (RFP) established 16 December 1957 as the date of proposal submission.

4. The members of the Board and working group reviewed and studied proposals submitted by the period 16 December - 7 January.

5. During the period 7-10 January 1958, the Board heard presentations made by and reviewed reports submitted by EK, IBM, RCA and R-W. The Board assigned relative weights to specific areas of evaluation as follows:

Technical evaluation	600 points
Management potential	250 points
Resources aspects	150 points

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The ratings made by the working groups were thoroughly reviewed by the Board and were accepted with minor revisions. The Board had assigned a detailed point breakdown for each individual element of the detailed criteria rated by the working group. These weightings were applied to the approved ratings and a total point score for each contractor was obtained.

The Board found the relative over-all evaluation of the four competing contractors to be as follows and unanimously recommended the selection of R-W as the most qualified source:

Contractor	Total Points Scored
R-W	4426.5
RCA	3293.0
IBM	2835.5
EK	1852.0

6. Colonel Burhans, Co-chairman of the Board, briefed General Graul on 10 January concerning the Boards procedures, deliberations and recommendations. General Graul concurred in the Boards unanimous recommendation of Ramo-Wooldridge as the most qualified contractor and directed the immediate initiation of procurement action.

7. The record of the Board proceedings and findings is in final stage of preparation and will be formally submitted by separate letter on or before 23 January 1958.

SIGNED

[illegible] H. TERHUNE, JR
[illegible] USAF
[illegible]
[illegible]

WDTR dh

[illegible] Weinberg

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R+D1

COORDINATION SHEET

UNCLASSIFIED

JAN 15 19 03 '58

OFFICE OF ORIGIN WILL ENTER OFFICE SYMBOLS IN THE "TO" BLOCKS IN ORDER OF DESIRED COORDINATION.

PERSON COORDINATING WILL ENTER NAME AND DATE IN APPROPRIATE BLOCK

PRIORITY

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COMMANDER, AFBMD, INGLEWOOD, CALIFORNIA

COMMANDER
ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE, NEW YORK

RO

UNCLASSIFIED FROM WDTR 1-6-E FOR GENERAL D. GRAUL. THIS WILL CONFIRM CONVERSATION ON 14 JANUARY BETWEEN GENERAL GRAUL AND COLONEL F. ODER THIS DIVISION. GENERAL B. SCHRIEVER HAS BEEN BRIEFED REFERENCED FINDINGS OF SUBSYSTEM I SOURCE SELECTION BOARD AND HAS REQUESTED THAT GENERAL GRAUL TAKE IMMEDIATE ACTION TO INFORM THE HONORABLE MR. DOUGLAS, SECRETARY OF THE AIR FORCE, OF THE BOARD'S RECOMMENDATION, THE COMPREHENSIVENESS OF ITS DELIBERATIONS, AND THE ANTICIPATED PROCUREMENT ACTION, PRIOR TO ACCOMPLISHING THE FORMAL PROCUREMENT NEGOTIATIONS.

cc: General Schriever

JAN 58

[illegible]NDER

HAROLD T. [illegible], MAJOR, USAF

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SIGNED

FREDERIC C. E. ODER

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MEMORANDUM FOR DEPUTY COMMANDER, WEAPON SYSTEMS 23 JAN 1958

SUBJECT: Survey of Research and Development In Support of
USAF Intelligence and Reconnaissance Functions

1. A survey team from the Directorate of Readiness and Materiel Inspection, Office of the Inspector General, Hq USAF, is scheduled to visit AFBMD on 10 February 1958.

2. Purpose of survey is to evaluate and report to the Chief of Staff, Hq USAF, on the effectiveness of Research and Development support being provided USAF Intelligence.

3. Request you designate a Project Office for this survey and arrange to present the briefing referenced in paragraph 6 of attached letter.

4. Copies of agenda developed for this briefing should be furnished this office and WDSI.

SIGNED

1 Incl
a/s

J. L. HAMILTON
Colonel, USAF
Executive Officer

Copy furnished
WDSI

COPY

OFFICE OF THE INSPECTOR GENERAL
UNITED STATES AIR FORCE
Norton Air Force Base, California

SUBJECT: Survey of Research and Development in Support of USAF Intelligence and Reconnaissance Functions, 5 January - 27 January 1958

TO: Commander
Air Research and Development Command
[illegible] Command
P.O. Box 1395
Baltimore, Maryland

1. A survey of Research and Development in Support of USAF intelligence and reconnaissance functions will be conducted during the period 5 - 27 January 1958. The intelligence inspection team consisting of Colonel William H. Hargett and four officers from the Directorate of Readiness and Material Inspection, Office of the Inspector General, USAF, will arrive at Headquarters, Air Research and Development Command at 0830, 8 January 1958.

2. The purpose of the survey is to evaluate and report to the Chief of Staff, Hq USAF, on the effectiveness of research and development support being provided USAF intelligence. The scope of the survey includes emphasis on the research and development cycle from the time individual intelligence support requirements are initially established to final development.

3. The inclosed itinerary reflects preliminary planning and is subject to change at the discretion of the team chief. Subsequently alterations which may become necessary as a result of orientation briefings at Hq USAF will be forwarded to your command.

4. Each team member possesses a final TOP SECRET clearance and a "need to know" requirement for all information determined by the team chief to be essential to the proper evaluation of the intelligence and reconnaissance support function in accordance with paragraph 6b, AFR 123-1. Special Intelligence clearances are possessed by the team chief and two team members and notification to this effect will be forwarded through appropriate channels.

5. A formal briefing is desired at 0900, 8 January 1958 including but not limited to:

a. The command mission and organization, with specific reference to responsibilities for reconnaissance and intelligence research and development;

b. Current projects, plans and programs, pertaining to these same areas;

c. Exchange of information, program coordination and other relationships between ARDC and AMC.

6. Similar briefing, limited in scope to the missions of the individual Centers and Divisions are requested on the first day at each installation.

7. Written copies of the briefings and other material presented should be available for retention by the team.

8. Request local ground transportation and quarters be provided in accordance with the inclosed itinerary, except for period 5 - 8 January 1958. TOP SECRET working space for six officers and part-time services of a stenographer with a security clearance of TOP SECRET will be required during the period the team is at Wright Air Development Center.

9. Representatives from your command are invited to accompany the inspection personnel during their survey.

FOR THE CHIEF OF STAFF:

JACK W. WOOD
Major General, USAF
Director of Readiness and
Materiel Inspection
Office of the Inspector General

1 Incl
Itinerary

Copies furnished
Comdr, RADC
Comdr, WADC
Comdr, AFCRC
Comdr, AFMDC, [illegible]

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